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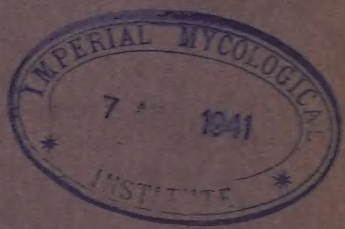

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Reports of Departments, Special Reports, reprints, etc., etc., should be sent as soon as they are issued.

Books for Review.

The Editor will be glad to receive books for review in the *Veterinary Bulletin*.

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IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

Vol. 11.] April, 1941. [No. 4.

DISEASES CAUSED BY BACTERIA AND FUNGI

DAVISON, E., & DACK, G. M. (1939). **Some Chemical and Physical Studies of Staphylococcus Enterotoxin.**—*J. infect. Dis.* **64.** 302–306. 3 tables. [5 refs.]

Using different methods of assay, *viz*, intravenous injection of, or feeding large amounts to, monkeys or kittens, it was found that staphylococcus enterotoxin exhibited the following properties :– (1) relative stability to heat, but prolonged boiling or autoclaving gradually decreased its potency ; (2) it was not extracted from filtrates by chloroform ; (3) filtrates treated with alcohol gave varying results which indicated that some undetermined factor controlled alcoholic precipitation ; the lethal toxin, however, tested by intravenous injection into mice, was destroyed, while the enterotoxin retained its potency after treatment with alcohol, and (4) it is salted out from saturated solutions of ammonium sulphate but not from half saturated solutions.—R. A.

LITTLE, R. B. (1940). **The Control of the Chronic Form of Streptococcic Mastitis.** —*J. Amer. vet. med. Ass.* **97.** 212–220. [Numerous refs.] [Author's summary copied *verbatim*].

It has been shown that in two herds the chronic form of mastitis caused by *Streptococcus agalactiae* was detected by bacteriological examination of the secretion from individual cows and controlled by the elimination of all infected animals. One herd has been free from infection for nearly three years and the other for over four years.

In another herd raised under special precautions *S. agalactiae* has never been detected in the secretion of any cow during a period of nine years.

In one herd where the infected animals were maintained in the same stable with the normal cows and milked last, new cases appeared throughout the period of observation.

The results of this study suggest that the contagious form of mastitis can be more quickly eradicated from a herd when the infected animals are immediately disposed of or segregated from the normal cows.

SMITH, L. W., MORGAN, Isabel M., & MUDD, S. (1940). **Histopathological Changes Produced in Rabbits by Experimental Inoculation with Hemolytic Streptococci, Certain of their Component Factors and Saponin.**—*Amer. J. Path.* **16.** 87–94. 4 figs. on 1 plate, 1 table. [3 refs.]

Groups of rabbits (some 60 animals in all) were inoculated with whole streptococci, with their component parts, or with saponin as a haemolytic control agent, and a histological examination made after death or slaughter at appropriate intervals. The groups included :– (1) normal controls ; (2) rabbits inoculated with nucleoprotein agglutinogen (filtered or unfiltered) prepared by sonic disintegration, or by drying by the lyophil or cryochem processes and by subsequent grinding in a low temperature ball mill as described by SEVAG, LACHMANN & SMOLERS (1938) ; (3) rabbits inoculated with a rough strain of a Lancefield group A *Streptococcus* ; (4) rabbits inoculated with living cultures of whole mucoid group A streptococci ; (5) rabbits injected with a 9% solution of

saponin; (6) rabbits injected with reversible oxidizable streptococcal haemolysin, and (7) a few animals inoculated with whole streptococci of group B, C, or D.

It is concluded that the results suggest, firstly, that the lytic fractions (*e.g.* group 6, above) of the streptococci are toxic and responsible for the rather generalized and extensive vascular lesions which occurred throughout the viscera of animals inoculated with them; secondly, that the nucleoprotein agglutinogen or labile antigen fraction (as it was earlier called) is essentially non-toxic in character, producing no changes of either a toxic or vascular nature of any significant degree. It is suggested that the nucleoprotein fraction might prove of value as an immunizing agent against experimental infection in rabbits, thus avoiding the harmful effects of the toxic lytic fraction present in the whole organisms.

—A. W. STABLEFORTH.

ANGEVINE, D. M., & ROTHBARD, S. (1940). **The Significance of the Synovial Villus and the Ciliary Process as Factors in the Localization of Bacteria in the Joints and Eyes of Rabbits.**—*J. exp. Med.* **71.** 129–135. 3 tables. [10 refs.]

After discussing the anatomy and histology of the synovial villi and ciliary processes, the authors describe experiments carried out to determine how soon bacteria, which have been injected intravenously, appeared in the eyes and joints and the frequency with which they became localized in the various organs. Rabbits were inoculated intravenously with 4 c.c. of 18-hour broth cultures of a relatively avirulent group A haemolytic *Streptococcus* and were killed at intervals varying from three hours to five days. In one experiment the tissues were placed in nutrient broth and incubated in a sterile container for periods of from 3–24 hours. In a second the joints were first injected with 1 c.c. of either broth or saline, and, together with tissues of other organs, were placed in a similar fluid and incubated for periods of from 12–24 hours. In a few instances the animals were killed, placed in an incubator at 37°C. for 18 hours and then autopsied. The results, which are given in tabular form, showed that the most favourable incidence of localization in joints and eyes in relation to time after injection was from 24–48 hours, and that bacteria were observed in the joints and eyes more frequently than in any other organ, with the exception of the spleen.

It appears that when arthritis or cyclitis occurs in the rabbit, the synovial villi and ciliary processes are the most frequent, and usually the primary, seat of infection.—J. R. L.

GAGO DA CÂMARA, N. (1938). Relato àcerca da preparação e aplicação de uma vacina tipo carbozoo. [**Preparation and Application of Carbozoo Anthrax Vaccines**].—*Repos. Lab. Pat. vet., Lisboa.* **4.** 259–265. [English and French summaries].

The author describes the preparation of two saponin vaccines. The first, which was a heat-attenuated agar culture containing saponin was tested on a few sheep and goats, but proved to be too severe after subcutaneous inoculation. A second vaccine was therefore made using a culture from Milan [presumably the strain used for the original carbozoo vaccine—Ed]. It was given to a total of about 160 horses, cattle, sheep, goats and pigs and was well tolerated by all, except by two horses and three goats, which required serum therapy.

The vaccine showed good keeping qualities in Africa (four months at least).—M. WATSON.

BRYAN, T. B. L. (1940). **Tuberculous Disease of the Vertebrae.**—*E. Afr. med. J.* **17.** 177–184. 8 figs. on 2 plates. [5 refs.]

Clinical records of cases in Africans. B. emphasized the relation of the disease to drinking infected milk, but could not give any information on the incidence of TB. in the cattle of the area from which the cases came.

HERMANSSON, K. A. (1939). Könstuberkulosens smittfarlighet. [**Infectivity of Tuberculosis of the Uterus in Cows**].—*Skand. VetTidskr.* **29.** 833–857. 24 tables. [English summary].

H. carried out 25 inoculation tests on groups of g. pigs with serial dilutions of uterine excretion obtained from cows, most of which were suspected of TB., because their calves were found to be affected with congenital TB. The excretion was treated with antiformin and injected in doses corresponding to a range of 0·1–0·00001 mg.

All cases gave positive results, two with a dose of 0·00001 mg., nine with a dose of 0·0001 mg., and 12 with a dose of 0·001 mg. As an infected uterus may contain as much as 1 kg. of tuberculous exudate, the great danger of cows with such open TB. is evident.—J. E.

VERGE, J., DRIEUX, H., & BASILLE, D. (1940). Les formes réputées contagieuses de la tuberculose bovine aux abattoirs de La

Villette. Importance et fréquence aux abattoirs de La Villette, des formes réputées légalement contagieuses de la tuberculose bovine et de la tuberculose à caséification rayonnée des Bovidés. **[Importance and Frequence in the Abattoirs of La Villette of Forms of Bovine Tuberculosis Regarded Legally as Contagious, as well as of " Radially Caseated " TB.].**—*Bull. Acad. vét. Fr.* **13.** 29–37. 4 tables.

The authors give their interpretation of the forms of TB. of the lungs, intestines, udder, and uterus which come within the decree of 1934 as legally contagious forms of TB., and describe their relative frequency compared with the total number of tuberculous bovines (1,097) examined during the year 1937. A table shows the incidence of advanced pulmonary TB. according to sex, age, and breed, it being highest in cows with 61·62%, 46·05% in bullocks, and 37·93% in bulls with a total average of 56·21% of numbers examined. One case of intestinal TB. involving the mucous membrane was found. A figure of 4·74% incidence for udder TB. is given for tuberculous cows examined. TB. of the uterus was found in 5·1% of cases and seemed to correspond to age plus calf bearing in its incidence. The form of TB. described as " radially caseated " occurs as a hypertrophying inflammation and was most frequent in bulls (5·75%) with an average incidence of 3·9%. Lymphoid tissue was most frequently affected and lesions of the parenchymatous organs (lungs, liver, kidneys, and udder) occurred occasionally. Some 64·4% of these cases could be classified also as contagious (legally). The distribution of the lesions among the 59 cases is tabulated.

—C. V. WATKINS.

PAGEL, W. (1940). **Experimental Tuberculosis. Observations on Tissue Reaction and Natural Resistance.**—*Amer. Rev. Tuberc.* **42.** 58–69. 6 figs., 2 charts. [15 refs.]

Macroscopical and histological examinations were made of the lesions of mice intracutaneously infected with bovine, human, and avian types of tubercle bacilli; approximately 1 mg. of bacilli suspended in saline was used for inoculation. A typical tissue reaction resulted in which the proliferation of foam-cells (large mononuclear cells filled with lipoid) was the most conspicuous feature. These cells ingest and convert the tubercle bacilli, originally basophile, into eosinophile rods and granules which represent either very young stages in the life of the bacillus, or inactive or damaged elements. It is suggested that the excess of eosinophile bacillary elements in the infected tissue of the mouse is a histological expression of the natural resistance of this animal towards tuberculous infection. The almost exclusive presence of basophile bacilli in the tissue of g. pigs and rabbits (animals with low natural resistance to TB.), infected in the same way and simultaneously with the mice, supports this conclusion. Other differences between the tissue reaction of the mouse, and those of the g. pig and rabbit were that the lesion in the former was much smaller than in the latter, no proper caseous necrosis was visible in the mouse, and no genuine tubercles nor proliferation of mononuclear cells were observed; foam cells, on the other hand, never appeared in the rabbit or g. pig. It appears from the histological evidence that the tubercle bacillus undergoes definite morphological changes and elicits a tissue reaction with marked characteristics of its own.

Reinfection in the mouse was followed by the same acceleration and intensification of response as in the non-resistant animal, although typical wheal phenomena were observed in two exceptional instances only. No appreciable influence of allergy on the fate of bacilli used for reinfection was demonstrated in the mouse.—R. ALLCROFT.

CRAWFORD, A. B. (1938). **Studies in Avian Tuberculosis. I. Avian Tubercle Bacilli in Generalised Disease in Swine. II. Comparative Virulence of Avian and Bovine Tubercle Bacilli for Rabbits and Guinea Pigs. III. Sensitization Method of Differentiating Avian from Bovine Infection in Guinea Pigs and Rabbits. IV. The Possible Role of the Avian Tubercle Bacillus in Infection in Man.** —*Amer. Rev. Tuberc.* **37.** 579–597. 4 tables. [11 refs.]

I. FELDMAN reported [*V. B.* **7.** 5.] that out of 30 cases of generalized TB. in swine examined by him, 24 were due to the avian bacillus. This finding contradicts the view that this type of infection in swine is of a non-progressive nature, confined to the mesenteric lymph nodes. In the present article C. confirmed FELDMAN's view; he examined 36 tuberculous pig spleens, and 21 were found to be infected with avian bacilli. Suspensions of nodular material from

each pig spleen were injected subcutaneously into two g. pigs and intravenously into two rabbits and the animals were tested intradermally with avian and with mammalian tuberculin 5–6 weeks after inoculation. Cultural differentiation was obtained by sowing several tubes of modified Löwenstein's medium with infected tissue from each experimental animal dying of TB. The isolation of avian tubercle bacilli from 21 pig spleens and of bovine tubercle bacilli from the remainder was confirmed by the tuberculin test results.

II. Thirty g. pigs, inoculated subcutaneously with suspensions of lesions caused in pigs' spleens by bovine type tubercle bacilli, all died of generalized TB. in 2–4 months, whereas 42 g. pigs inoculated with material from lesions caused in the spleens of pigs by avian type tubercle bacilli showed only a slight swelling of an inguinal gland and survived. Similarly, 30 rabbits, inoculated intravenously with suspension of lesions caused in pigs by bovine type tubercle bacilli, all died within 99 days, the chief site of localization being in the lungs, while only 23% of 42 rabbits, similarly inoculated with avian tubercle bacilli, died within the same period, having relatively slight lung lesions with a variable chief site of localization.

III. An attempt was made to differentiate the type of infection in pigs by testing the sensitization to tuberculin of 72 rabbits and 72 g. pigs inoculated with material from TB. lesions. The tuberculin tests were made six weeks after inoculation. It was found that rabbits were of no value for this purpose. On the other hand, reactions in all the g. pigs to both tuberculins were remarkably clear cut and differentiable at the 48th hour, confirming both the typing made by examination of the lesions and by culture. Experimental dual infection of eight g. pigs with avian and bovine tubercle bacilli was detected by well marked reactions with central necrosis to both tuberculins, although slightly more extensive to mammalian than to avian tuberculin.

IV. In a discussion of species immunity as a relative factor in TB., C. states that the occurrence of generalized TB. in sheep and pigs due to avian bacilli led him to suspect that the various types of tubercle bacilli might gradually assume an increased virulence for naturally immune species. Experiments are summarized in which cattle were fatally infected by four intravenous injections of human tubercle bacilli, the lesions increasing in extent and distribution with each injection A review of the few proved cases of avian TB. in man indicates that the possibility of a dangerous infection in human beings is remote.

—R. O. Muir.

Saenz, A. (1939). Problème de la virulence du bacille de Koch et résultats de son étude dans les tuberculoses externes et internes. Acquisitions récentes sur le pouvoir pathogène des bacilles tuberculeux morts. [**Virulence of** *Mycobacterium tuberculosis*. **Recent Observations on the Pathogenic Effects of Killed Bacilli**].—*Rev. Immunol.* **5.** 491–522. 2 tables. [Numerous refs.]

S. claims that the effects produced by *Mycobact. tuberculosis* are due, in large part, to the endotoxin which it elaborates. He suggests that if the essential characteristic of pathogenicity, *viz*, multiplication, is suppressed, it is still possible to induce the formation of typical metastatic lesions. This is well shown by the intratesticular inoculation of dead organisms incorporated in liquid paraffin. If bovine strains are injected into the rabbit by this route numerous caseo-necrotic lesions are formed in the lungs indistinguishable from those induced by living organisms, whereas human strains produce little effect. Killed avian strains, on the other hand, evoke a hypertrophy of the pulmonary tissues with centres of granulation, while the reaction of dead attenuated strains is directly proportional to the effects of the same strains when living.

The classification of types of *Mycobact. tuberculosis* according to virulence (super virulence, normal virulence and sub-virulence) by the intramuscular injection of g. pigs with graded doses of culture ranging from 10^{-6} to 10^{-8} of a milligram, is also discussed.—R. E. G.

Nègre, L., & Bretey, J. (1940). Sur la vaccination antituberculeuse du cobaye au moyen du BCG introduit par des piqûres cutanées multiples ou par des scarifications de la peau. [**BCG Vaccination of G. Pigs by Multiple Skin Pricks or Scarification**].—*Ann. Inst. Pasteur.* **64.** 189–195. [3 refs.]

The authors, having repeated two methods of BCG vaccination of g. pigs, confirm the findings of Rosenthal [*V. B.* **9.** 820.] concerning a multiple skin-prick method and of Weil-Halle (1939) concerning a method for scarification of the skin. They used an emulsion

of BCG (5 mg. per c.c.) for vaccination, and subcutaneous injection of 0·0005 mg. of virulent *Mycobacterium tuberculosis*, human strain 239, for testing the immunity produced. The skin pricks and scarifications were made through a drop of the BCG emulsion placed on shaved skin of the backs of the test g. pigs. Of 17 g. pigs getting 30 pricks, 8 reacted to tuberculin after eight days and 7 out of 11 survivors reacted after one month. These 7 together with 10 controls were tested for immunity. Only 3 of the vaccinated g. pigs survived for six weeks; they were then killed along with the controls. Lung and liver lesions were advanced in the controls and almost absent in the test g. pigs.

Rather better results were obtained when 60 skin pricks were made. Six scarifications 1 cm. in length made in 15 g. pigs produced allergy in 6 after eight days and in 7 out of 9 survivors after one month. These 7 together with 8 controls were tested with *Mycobact. tuberculosis* and killed after six weeks. The spleens of the test g. pigs were normal or only slightly diseased and the lungs and livers were healthy. All these organs were grossly diseased in the controls. Eight repetitions of the scarifications at intervals of three days produced allergy in 7 out of 11 g. pigs eight days after the beginning of the treatment and in all 10 survivors at its completion. Eight survivors and 8 controls were tested by *Mycobact. tuberculosis* and killed after seven weeks. Six surviving test g. pigs were free from the gross lesions found in the controls. [It is noted that all intercurrent disease losses occurred in the vaccinated animals. No protocols are given to substantiate the percentage figures given for the allergy produced.]—C. V. Watkins.

Oswald, N. C. (1940). **Behavior of Tubercle Bacilli Following their Intravenous Injection into a Resistant Animal (Rat).**—*Arch. Path.* **29.** 678–682. 3 tables. [2 refs.] [Author's summary copied *verbatim*].

Tubercle bacilli, both bovine and human, introduced into the blood stream of the rat remain viable in the lungs, liver and spleen.

Direct microscopic examination of sections is an unsatisfactory method for determining the number of living tubercle bacilli and fails to demonstrate them when few are present. Counting of colonies in cultures made with weighed quantities of tissue, though subject to error caused by clumping of bacilli, determines more exactly the relative number of micro-organisms in internal organs at intervals after infection.

Bovine tubercle bacilli on arrival in the lungs of rats after intravenous inoculation increase almost continuously so that great numbers are present after from two to six months. Human tubercle bacilli on arrival in the lungs after intravenous injection multiply, but the increase which occurs is much less than that with the bovine type.

Bovine or human tubercle bacilli that reach the liver and spleen after intravenous inoculation persist and in a few instances multiply; multiplication is usually inhibited, however, so that after six months the average number is less than that at an earlier period.

Anderson, R. J., Peck, R. L., & Creighton, M. M. (1940). **The Chemistry of the Lipids of Tubercle Bacilli. LXI. The Polysaccharide of the Phosphatide Obtained from Cell Residues in the Preparation of Tuberculin.**—*J. biol. Chem.* **136.** 211–227. 2 tables. [5 refs.] [For part LX, see *V. B.* **10.** 822].

The polysaccharide portions of the phosphatides prepared from bacterial residues of a strain of the human type of the tubercle bacillus (strain 2067) for the preparation of tuberculin, differed from those of the phosphatide prepared from living tubercle bacilli, strain H 37. One fraction gave a polysaccharide which, on dephosphorylation resolved into free inosite and glycoside, the latter hydrolysing into mannose and an unidentified reducing sugar. The second polysaccharide similarly produced a dephosphorylysed fraction yielding free inosite and a glycoside which hydrolysed into about equal parts of inosite and mannose and some other reducing sugar. These reducing sugars gave typical glucosazones. Neither of the polysaccharides gave the glycoside manninositose (as isolated from strain H 37). The organic phosphoric acids split off from the polysaccharides were of two types :– (a) an acid corresponding approximately in composition to inosite monophosphoric acid, and (b) an acid closely related to glycerophosphoric acid. The original should be consulted for details of the chemical procedures employed in these investigations.—Alfred Eden.

Wartman, W. B., & Ingram, E. S., Jr. (1940). **Chemotactic Properties of Tuberculophosphatide and Tuberculopolysaccharide.**—*Arch. Path.* **29.** 773–776. 2

tables. [7 refs.] [Authors' summary copied *verbatim*].

The chemotactic properties of a phosphatide and a polysaccharide fraction of the tubercle bacillus have been found *in vitro*. Under the conditions of the experiments it was found that the tuberculophosphatide in concentrated form is toxic for both human and rabbit neutrophils, but in suitable dilution it causes weak attraction of these cells. The tuberculopolysaccharide causes weak negative chemotropism of the leukocytes.

THOMSEN, K. G. (1939). Desinfektionsforsøg med Natrium-orto-fenyl-fenolat mod Tuberkelbakterier. [**Disinfectant Power of Sodium Ortho-Phenyl-Phenolate on Tubercle Bacilli**].—*Skand. VetTidskr.* **29.** 1144–1154. [10 refs.] [Abst. from author's English summary].

A survey is given of studies on the disinfectant properties of sodium orthophenylphenolate against the tubercle bacillus, with a discussion of the more essential factors which may have influenced the results obtained. In view of the great differences in these results, T. concludes that sodium orthophenylphenolate is unreliable as a disinfectant against the tubercle bacillus.

LAPORTE, R. (1939). Sur la toxicité des bacilles paratuberculeux. [**Toxicity of Paratubercle Bacilli**].—*C. R. Soc. Biol. Paris.* **131.** 931–934. [5 refs.]

L. tested strain P, isolated from an abscess in a child, two laboratory strains (Milch Moeller and D6) of paratubercle bacilli, and one laboratory strain of Timothy grass bacilli, for toxicity for g. pigs and rabbits by intracranial, intradermal, and intravenous injections, and judged their toxicity in this order. Doses of 2 mg. of all except the last named were lethal for g. pigs within a few hours of intracranial injection, and doses of 0·2 mg. usually within 24 hours. A smaller dose, however, sometimes caused only emaciation with later recovery, similar to the effect obtained by large doses of Timothy grass bacilli. Dermal injection of 5 mg. caused only redness and thickening of the skin between the 7th and 24th hours, often with vesication and a small necrotic plaque, except for strain P which provoked a more intense reaction in both healthy and tuberculous g. pigs. Intravenous injection of 50 mg. for g. pigs and 100 mg. for rabbits usually caused emaciation with later recovery. Strain P sometimes produced " fatal lung consolidation " in 3–4 weeks. Repeated small doses of 10 mg. twice weekly were fatal in 75% of rabbits and doses of 15 mg. were fatal for all rabbits tested. For strain D6 2 mg. and for Timothy grass bacilli 70–100 mg. twice weekly were also fatal for rabbits. L. concluded that the toxicity of paratubercle bacilli varies greatly according to the strain.—C. V. WATKINS.

BANDEIRA, J. A. T. (1937). Da incidencia do mormo no Brasil. [**The Incidence of Glanders in Brazil**].—*Bol. vet. Exer. Brazil.* **4.** 330–332.

The author discusses the incidence of glanders in Brazil and describes cases in human beings.—MILLER WATSON.

EGOROV, I. A. (1940). Dezinfektsiya svinykh shkur, zarazhennykh bakteriyami rozh, s odnovremennym tuzlukovaniem syr'ya. [**Simultaneous Disinfection and Pickling of Pig Skins Infected with *Erysipelothrix rhusiopathiae***].—*Sovyet. Vet.* No. 4. pp. 47–51.

Experiments were conducted with 44 light, medium, and heavy hides of pigs and various disinfectants in order to determine the cheapest and simplest means of destroying *E. rhusiopathiae* in salted hides. It was found that the addition of 1·3% of commercial HCl to the pickling fluid, the hides being immersed for 48 hours at 10°–17°C., destroyed the infection in the heaviest hides.—E. MARTIN.

VITTOZ, R., & NGUYEM-NGOC-MINH. (1939). Conditions géographiques et climatiques d'apparition des pasteurelloses sur la province de Mytho (Cochinchina). [**Geographic and Climatic Conditions in which Pasteurellosis Occurs in Mytho Province, Cochinchina**].—*Rec. Méd. vét. exot.* **12.** 147–170. 7 tables. [Numerous refs.]

Pasteurellosis is prevalent and the geographical and climatic conditions favour its existence. The country is flat, averaging 1 m. above sea level. The average temperature is 27·6°C. with a maximum of 29·7°C. in April and a minimum of 26°C. in December. The year is divided into a dry season (November–April) and a rainy season (May–October). The annual average rainfall is 1,668 mm. during 94 days of rain.

The authors describe the local and unfavourable hygienic conditions which diminish the resistance of oxen, buffaloes, pigs, and

fowls. After heavy rains the temperature of these animals falls from 39·5°–38°C., from 40°–37°C., from 40°–38·5°C., and from 42·5°–40·8°C. respectively. As a result of studying the disease in the field for ten years the authors make the following observations :– (a) the first outbreaks of pasteurellosis in buffaloes appear with the first rains ; (b) the disease in buffaloes extends during the rainy season, May–July being the worst period ; (c) during the dry season only sporadic cases occur ; (d) the outbreaks are more numerous when a period of fine but constant rain marks the transition between the dry and the rainy seasons; (e) fowl cholera and pasteurellosis in pigs appear together in March–April, develop at the same time as pasteurellosis in buffaloes (May–July), disappear in August–September and reappear in October, November, and December, and (f) the annual incidence of the various pasteurelloses is connected with the rainfall, humidity and density of the air, and the temperature.

The authors give advice to breeders on the improvement of hygienic conditions. They stress the importance of vaccination against the disease in January–February for pigs, and fowls, and in February–March for bovines.—L. T.

BYINGTON, L. R. (1940). **Two Epizootics of Plague Infection in Wild Rodents in the Western United States in 1938.**—*Publ. Hlth Rep., Wash.* **55.** 1496–1501. 3 figs., 4 tables. [Author's summary copied *verbatim*].

Epizootic outbreaks of plague in rodents are occurring in the western United States. These are part of a widespread enzootic of the disease in many species of rodents. The two outbreaks here reported took place in regions sparsely inhabited by man and no human cases were known to have been associated with the infection in rodents.

DUJARDIN-BEAUMETZ, BALLET, B., & CÉBRON, J. (1938). Pseudo-tuberculose chez l'homme. **[Pseudotuberculosis in Man].** —*Pr. méd.* **46.** 43–45. 1 graph. [9 refs.]

An account of odd cases of *Pasteurella pseudotuberculosis* infection in human beings.

KAUFFMANN, F. (1939). Die serologische Salmonella-Diagnose. **[Serological Identification of Salmonella].** — *Acta path. microbiol. scand.* **16.** 278–302. 9 tables. [8 refs.] [In German].

An international *Salmonella* centre at the Copenhagen State Serum Institute supplied test sera and cultures in order to correlate the findings of workers throughout the world. At that time 71 types of *Salmonella* were known and indications are given of the methods of preparation of H, O, and Vi sera for identification purposes.

Twenty "O" (including "Vi") sera are necessary and the inocula are broth cultures heated at 100°C. for 2½ hours. The following is the list with their corresponding O antigens :–

1.	*S. paratyphi A*	I, II
2.	*S. paratyhhi B*	IV, V
3.	*S. reading*	IV
4.	*S. thompson*	VI, VII
5.	*S. newport*	VI, VIII
6.	*S. enteritidis*	IX
7.	*S. typhi* (living)	Vi
8.	*S. london*	III, X, XXVI
9.	*S. newington*	III, XV
10.	*S. senftenberg*	I, III, XIX
11.	*S. aberdeen*	XI
12.	*S. poona*	XIII, XXII
13.	*S. worthington*	I, XIII, XXIII
14.	*S. carrau*	VI, XIV, XXIV
15.	*S. onderstepoort*	(I) VI, XIV, XXV
16.	*S. hvittingfoss*	XVI
17.	*S. kirkee*	XVII
18.	*S. cerro*	XVIII
19.	*S. kentucky*	(VIII) XX
20.	*S. minnesota*	XXI, XXVI

There are thirty H sera prepared by inoculating animals with broth cultures grown for 6–8 hours and then killed by the addition of 0·5% formalin followed by incubation at 37°C. for 20 hours. The following is the list with their H antigens :–

1.	*S. paratyphi A*	a
2.	*S. hvittingfoss*	b
3.	*S. cholerae suis* spec. (rough)	c
4.	*S. typhi* (rough)	d
5.	*S. eastbourne*	eh
6.	*S. potsdam β*	en
7.	*S. abortus equi β*	enx
8.	*S. derby*	fg
9.	*S. enteritidis*	gm
10.	*S. montevideo*	gms
11.	*S. dublin*	gp
12.	*S. rostock*	gpu
13.	*S. moscow*	gq
14.	*S. senftenberg*	gst
15.	*S. aberdeen* spec.	i
16.	*S. thompson* spec.	k
17.	*S. london* spec.	lv
18.	*S. dar es salaam*	lw
19.	*S. oranienburg*	mt

20.	*S. virchow* spec.	r
21.	*S. bareilly* spec.	y
22.	*S. poona* spec.	z
23.	*S. cerro*	z_4
24.	*S. kentucky β*	z_6
25.	*S. glostrup*	z_{10}
26.	*S. paratyphi B* nonspec.	12
27.	*S. newport* nonspec.	123
28.	*S. thompson* nonspec.	15
29.	*S. anatum* nonspec.	16
30.	*S. gaminara* nonspec.	17

O sera should contain O agglutinins only, Vi serum H, O and Vi agglutinins, and H sera H and O agglutinins. In some cases the identification of an organism may be made with unabsorbed sera and the slide technique; in other cases absorbed sera are necessary. When a test tube technique is used " O " antigens are determined with alcoholized suspensions and " H " antigens with formalized broth cultures. For diphasic organisms, colonies are selected by slide agglutination, grown in broth for 6–8 hours and killed by 0·5% formalin. The period of incubation for " O " aggl. is about 20 hours at 50°C. and for H aggln. 1–2 hours at the same temperature. Living cultures are used for " Vi " aggln. and either technique may be used, the temperature for test tubes being 37°C.

Slightly different methods are used in the absorption of O and H sera. " O " sera are absorbed with bacterial suspensions which have been washed with saline, heated at 100°C. for 1–2 hours and centrifuged. Two hours at 37°C. are allowed for absorption. H sera are absorbed with living bacteria at 37°C. for two hours and care is taken to add a disinfectant such as formalin to the supernatant serum after centrifugation.

Instructions are given for determining the antigenic structure of unknown organisms. For example the O antigens I and II are recognized by using several sera, one prepared against *S. paratyphi A* O (antibodies to factors I and II) absorbed with *S. paratyphi A* var. *durazzo* (a strain which contains factor II). This serum picks out strains containing factor I. For factor II a differential test may be made using two sera, one an unabsorbed serum (factors I and II), and one containing antibodies to factors I, III, XIX (*S. senftenberg*). H antigens are recognized with unabsorbed and absorbed sera and by adopting similar principles. The dilution of the serum used in slide aggln. tests depends upon its titre.

The diphasic phenomenon of ANDREWES and the $\alpha\beta$ phase variation of KAUFFMANN and MITSUI are brought into line and expressed as phases 1 and 2. There is another variation, a third phase which is of little practical importance but it exists in the variant of *S. paratyphi B* which had originally been described as a new type and named *S. abortus canis*.—R. LOVELL.

PAVANINI, G. (1940). Contributo allo studio delle " salmonelle " negli equini. (Ricerche sierologiche e colturali). [**Salmonella Infection in Horses**].—*Nuova Vet.* **18.** 178–183. 1 table.

P. states that no cases of salmonella infection in equines have yet been recorded in Italy. He carried out agglutination tests with the sera of 98 horses, of which 21 had been brought to the clinic to be examined for soundness; 63 were affected with some acute infection, and 14 had digestive troubles of various kinds. None of the animals examined showed an agglutination titre higher than 1 : 500, and P. considers that no conclusions can be drawn from these results.
—E. MARTIN.

I. BOTTORFF, C. A., Jr. (1939). **Pullorum Control and Eradication.**—*Conf. Nat. Poult. Improvement Plan, 1939.* pp. 79–92. 10 tables. Washington, D.C.: U.S. Dep. Agric.

II. BUNYEA, H. (1939). **Observations on Field Methods Employed in Conducting the Rapid, Whole-Blood Test.**—*Ibid.* pp. 93–97. [1 ref.] Washington, D.C.: U.S. Dep. Agric.

III. HINSHAW, W. R. (1939). **Pullorum Disease of Turkeys.**—*Conf. Nat. Poult. Improvement Plan, 1939.* pp. 98–103. Washington, D.C.: U.S. Dep. Agric.

IV. HOLM, G. C., WILLIAMS, J. K., CALLAHAN, B. F., & HALVERSEN, W. V. (1940). **Some Causes for False Reactions with Whole Blood Pullorum Disease Testing.** —*Vet. Med.* **35.** 511–513. 1 fig. [3 refs.]

I. Measures for the eradication of *Salmonella pullorum* infection as recommended by the State are enumerated. The gradual reduction of this infection in New Hampshire flocks is shown in a summary of the results of testing. This article also contains a discussion on the occurrence of nonspecific reactors. It is remarked that when *S. pullorum* is eradicated from a flock, the progeny soon lose any resistance they may have had against the disease, becoming very susceptible.

II. This is a description of methods for the efficient use of the rapid whole blood test for *S. pullorum* infection in fowls. The technical procedure of the disinfection of incubators and brooders, and of poultry yards and buildings is also given.

III. H. states that there is definite evidence to show that the disease in turkeys has become established, and is being transmitted by turkey carriers, although it was believed that the history of the outbreaks pointed to direct or secondary transmission from fowls to turkeys.

The total mortality in 56 acute outbreaks, involving 44,472 poults under a month old, was 18,464 poults (41·5%). H. considers that the whole blood test, as at present conducted, is not an efficient means of detecting carriers of *S. pullorum* in an eradication programme, and recommends the tube agglutination test for turkeys until the rapid test is improved so as to become reliable.

IV. It is suggested that infection with certain organisms such as a Gram-positive *coccus* to which reference is made and a species of *Alkaligenes* may be responsible for non-specific positive agglutination reactions to *S. pullorum* in fowls. Further, fowls affected with coryza occasionally gave positive reactions to the whole blood test. Twenty-four fowls, negative to all blood tests for *S. pullorum* were divided into five groups including controls and injected with *S. pullorum* antigen, commercial fowl cholera + fowl typhoid vaccine, mixed infection bacterin, or fowl cholera vaccine. Testing was begun seven days later, and results showed considerable difference in the sensitivity of the various antigens used.—S. G. Iyer.

Knapp, J. V. (1940). **The Effect of the Bang's Disease Control Program on Milk Production in Florida Dairies.**—*J. Milk Technol.* **3.** 33–35.

Blood testing for the eradication of brucellosis at intervals of 60–90 days was commenced on a voluntary basis in Florida in 1924 and introduced as a compulsory measure in 1936. All cattle in Florida are now tested monthly or more often if necessary. The yearly decline in reactors between 1934–39 was as follows:– 22·9% of 38,109 cattle, 7·8% of 143,915, 5·4% of 220,655, 2·6% of 350,436, 1·45% of 431,602, and 0·99% of 119,718 cattle.

A marked increase in milk production accompanied eradication of the disease, *viz*, in one area it increased about half a gallon per cow per day, whilst in another area 7,403 cows produced 1,430 gallons more per day than 8,304 cows prior to eradication.—H. E. B.

Spicer, A. (1940). **Vitamin E and Contagious Abortion (Br. Abortus Infection) in Cattle.**—*Vet. J.* **96.** 351–357. [1 ref.]

Rangoon rice bran or first polishings, as a source of vitamin E, was incorporated in the rations of dairy cattle of 15 herds infected with contagious abortion. A total of about 800 cows was involved, and observations extended up to four years in some instances. It is claimed that this measure caused a marked fall in the abortion rate in all herds, and that its use (or the use of some other suitable source of vitamin E) should be adopted on a wide scale. 2 lb. of rice bran per day is stated to be a suitable quantity for a dairy cow.—A. N. Worden.

Kieldberg, J. (1939). Er den paabudte Indskraenkning i Vakcination mod smitsom Kastning berettiget? [**Is the Restriction in the Use of Vaccination against Bovine Brucellosis Justified?**]—*Medlemsbl. danske Dyrlaegeforen.* **22.** 485–491.

A protest against an order of the Danish Veterinary Directorate removing the practitioner's power to decide in what herds live brucella vaccine may be used. According to the order, live vaccine may only be used in herds approved by the directorate.—J. E.

Lamont, H. G., Kerr, W. R., & Macnab, E. (1940). **Investigation by the Veterinary Research Division, Ministry of Agriculture, 1939–1940. [Anti-Abortion Vaccination Experiment on Calves].**—*Rep. agric. Res. Inst. N. Ire., 1939–1940.* p. 15. [Copied *verbatim*].

This experiment has been continued in the form described previously. There are at present in the experiment 35 control and 32 vaccinated heifers. As so far only one of these heifers has calved and entered the dairy herd, it will obviously be several years before any conclusive results will be obtained.

Poston, M. A., & Parsons, P. B. (1940). **Isolation of Brucella from Lymph Nodes.**—*J. infect. Dis.* **66.** 86–90. 5 figs.

Recently brucella have been isolated from human lymph nodes showing the histopathologic picture of Hodgkin's disease in human beings, and the authors describe the technique with which they have isolated these organisms from lymph nodes of 10 out of 19 cases. Of

these, seven were *Br. suis* and three *Br. melitensis*. Cultures of lymph nodes from patients with chronic brucellosis without clinical evidence of Hodgkin's disease were positive for *Br. melitensis* in two instances and for *Br. suis* in one. In a control series of cultures from 67 lymph nodes, *Br. suis* was isolated in one case.—S. J. GILBERT.

ORR, J. H., & REED, G. B. (1940). **Serological Types of *Clostridium perfringens*.**—*J. Bact.* **40.** 441–448. 4 tables. [12 refs.] [Authors' summary copied *verbatim*].

It is shown that in a group of 85 cultures of *Clostridium perfringens*, most of all of which belong to Wilsdon's toxigenic Type A, six show a close antigenic relationship on the basis of agglutination and precipitin reactions. A few others show some overlapping of antigenic components and the balance, by these methods of analysis, show no antigenic relationship. Earlier results which have shown no antigenic similarity between cultures, or results such as those of Meisel (1938) which indicate 6 out of 10 cultures to be antigenically similar, have probably given an incorrect picture of the antigenic heterogenicity or homogenicity of the species as a result of the analysis of too few cultures. Analysis of a much larger group of cultures might make possible arrangement of the species in antigenic groups but from the present results it is evident that the number of groups would be very large.

WEINBERG, M., & GUILLAUMIE, M. (1939). Préparation et propriétés des toxines *perfringens*, Vibrion septique, histolytique et *oedematiens*. Toxinogènese en présence de pyruvate de soude ou d'acide ascorbique. [**Preparation and Characteristics of *Clostridium welchii*, *Cl. septique*, *Cl. histolyticum*, and *Cl. oedematiens* Toxins. Effect on Toxin Production of Sodium Pyruvate or Ascorbic Acid**].—*C. R. Soc. Biol. Paris.* **131.** 1150–1154. [6 refs.]

Details of culture medium and temperature and duration of incubation are described for the preparation of the toxins of *Cl. welchii*, *Cl. septique*, *Cl. histolyticum*, and *Cl. oedematiens*. Data are given of the titres of 45 *Cl. welchii*, 9 *Cl. septique*, 9 *Cl. histolyticum*, and 18 *Cl. oedematiens* liquid toxins, the average yield of precipitated toxin and its average M.L.D. Stock strains of *Cl. welchii*, *Cl. septique*, and *Cl. oedematiens* retained their toxicity unabated in ordinary broth at room temperature in the shade and preliminary g. pig passage was not necessary for the production of potent toxin. The addition of 5–8 g. of dipotassium phosphate and 2 g. of sodium pyruvate per litre of broth increased the yield of *Cl. welchii*, *Cl. septique*, and *Cl. histolyticum* toxins by 1½–2 times in most instances. The addition of 0·15–0·25 g. of ascorbic acid per litre of broth had little effect on toxin production.—R. O. MUIR.

BUER, A. W. (1939). Aktinomykose. [**Actinomycosis**].—*Skand. VetTidskr.* **29.** 18–30. 1 table. [Numerous refs.] [English summary].

A general review of the literature on actinomycosis in man and animals. Four types of causal organism have been identified:—an aerobic and an anaerobic Actinomyces (Wolff-Israel), *Actinobacillus lignieresi*, *Bacterium* [*Corynebacterium*] *pyogenes*, and staphylococci. —J. E.

CATANEI, A. (1939). Étude des teignes des animaux en Algérie. [**Ringworm in Animals in Algeria**].—*Arch. Inst. Pasteur Algér.* **17.** 520–529. 4 figs. on 1 plate. [5 refs.]

Ringworm in horses is generally caused by *Microsporum equinum*; *Trichophyton* accounts for approximately 20% of the outbreaks. *Ctenomyces mentagrophytes* accounts for only a few cases. *M. gypseum* was incriminated in one case only—in a donkey. *T. discoïdes* was responsible for the disease in 34 calves examined. Ringworm was very rare in sheep; *T. discoïdes* and a new species *T. pruinosum* were found in the lesions. Amongst many herds of goats examined only one infected animal was detected and the species concerned was not identified. Dogs contract infection with three different forms, *M. canis*, *C. mentagrophytes*, and *Achorion schönleini*. Ringworm was detected in mice, but the causal parasite was not identified. C. describes the macroscopic and the microscopic characteristics of the lesions caused by each of the species, and the morphology of the parasites.—L. TOBBACK.

SHINN, L. E. (1939). **Factors Governing the Development of Variational Structures within Bacterial Colonies.**—*J. Bact.* **38.** 5–12. 2 figs.

The formation of certain variational structures such as "wedges", "sectors" and "outbursts" from bacterial colonies is considered in the light of the relative growth rates

of the variant (G_v) and of the parent colony (G_p). Although the discussion and analysis is primarily one of academic interest, S. draws two deductions from his considerations :– (1) There should exist a class of variants which can only rarely and with difficulty be obtained by the method of selection from differentiated areas of dissociating colonies. This class with a $G_v : G_p$ ratio of less than unity might manifest itself readily under other growth conditions such as in fluid culture. Such variants should be unstable in the colony state and should produce with relative frequency wedges of reversal forms. (2) Although it is relatively easy to transform M forms to S and S to R, the reverse is frequently impossible and even when it can be obtained this reversal is generally accomplished by secondary colony formation rather than by wedge formation. In liquid medium where the organisms are dispersed these reversals are relatively more easily obtained even when they are impossible in colony development. The conception of wedge formation being governed by $G_v : G_p$ ratios is utilized to clarify the situation for with a ratio greater than 1, wedge formation can easily occur ; when the ratio is less than 1, wedge formation would hardly be expected.—A. EDEN.

UTERMOHLEN, W. P., Jr., & GEORGI, C. E. (1940). **A Comparison of Cobalt and Nickel Salts with other Agents for the Detection of Hydrogen Sulfide in Bacterial Cultures.**—*J. Bact.* **40.** 449–459. 1 table. [16 refs.] [Authors' summary copied *verbatim*].

1. The toxicities of nickel and cobalt ions for a number of bacterial species in broth cultures were determined.

2. A medium containing proteose peptone, cysteine, glucose, dipotassium phosphate, nickel and cobalt nitrates, agar, and water was developed which compares well with present established media for detection of hydrogen sulfide production by bacteria.

3. Organisms usually considered to be negative hydrogen-sulfide producers, such as *Salmonella paratyphi*, *Streptococcus lactis*, *Escherichia coli*, and a number of *Aerobacter* and *Shigella* species, give positive reactions with bismuth or cobalt-nickel indicators, or both.

4. It has been shown that detection (and perhaps production) of hydrogen sulfide in bacterial cultures varies greatly according to the medium and indicator employed. A statement of the ability of a microorganism to produce hydrogen sulfide is of little value unless all factors are specified.

5. The possible explanation of this variation in the detection of hydrogen sulfide production by bacteria has been discussed.

DISEASES CAUSED BY PROTOZOAN PARASITES

DE SEQUEIRA, L. F. (1935). Contribution à l'étude de la virulence de " Trypanosoma gambiense ". [**Virulence of** *T. gambiense*].—*XIIe Congr. int. Zool. Lisbonne, 1935.* **3.** 1949–1954. 3 tables. [In French].

As a result of observation of cases of sleeping sickness in Portuguese Guinea the author thought it probable that spontaneous recovery can occur. Blood taken from one case in the early stages produced infection in all laboratory animals inoculated, but blood from the same case taken seven months later infected only three out of five animals, and 18 out of 45 subinoculated animals remained uninfected. Whilst a dog was killed by the strain as first isolated in 225 days, another dog resisted the strain as later isolated for 561 days. [Only two dogs were used in the course of the experiment].
—U. F. RICHARDSON.

PACKCHANIAN, A. (1940). **Experimental Transmission of** *Trypanosoma cruzi* **Infection in Animals by** *Triatoma sanguisuga ambigua.* — *Publ. Hlth Rep., Wash.* **55.** 1526–1532. 2 figs. on 2 plates. [13 refs.]

P. records that this species of *Triatoma* which is widely distributed in Florida can become infected with *Tryp. cruzi* and that this bug can transmit the infection when allowed to feed on g. pigs.

SCHAAF, J. (1939). Trichomonaden als Krankheitserreger beim Geflügel. [**Trichomonads as Causative Agents of Disease in Birds**].—*Proc. 7th World's Poult. Congr., 1939.* pp. 258–261. Washington, D.C. : U.S. Dep. Agric. [In German : English summary].

Trichomonads have been blamed for disease of the alimentary tract in turkeys and ducks,

and diphtheritic disease in fowls, but in none of these birds has their causative connexion with disease been demonstrated by reproducing it with pure cultures. S. investigated the role of trichomonads in fowl pox, but was unable to show either that they were able to produce the disease, or that their presence increased its severity.

On the other hand in pigeons, *T. columbae* has been shown to produce a disease associated with diphtheritic deposits in the mouth, pharynx, and crop, necrotic lesions in the lungs, liver, and pancreas, and fibro-purulent inflammation of the lungs, peritoneal cavity, and pericardium. This condition can be set up in young pigeons by either feeding or inoculating pure cultures of trichomonads. Outbreaks occur in young pigeons through infection from their parents which are carriers of the parasite, though they appear healthy. Infection may also be spread by contamination of food and water. The mortality in young pigeons may reach 80%. Removal of the diphtheritic matter and painting with tincture of iodine or other disinfectants, are recommended as treatment.—U. F. RICHARDSON.

I. SCHAAF, J., & SCHERLE, H. (1938). Ueber die Morphologie der Trichomonaden des Huhnes. [**Morphology of the Trichomonads of Fowls**].—*Zbl. Bakt. I. (Orig.).* **141.** 310–313. 3 figs. [8 refs.]

II. SCHAAF, J., & SCHERLE, H. (1938). Ueber die pathogene Bedeutung der Trichomonaden des Huhnes. [**Pathogenic Importance of Trichomonads of Fowls**].—*Ibid.* 313–318. [9 refs.]

I & II. Two species of trichomonads were found affecting the alimentary tract of fowls, one species inhabiting the mouth, crop and stomach, and the second species the intestine. Both species varied considerably in size, that in the mouth averaging 9·5μ long by 6·0μ broad. It possessed four anterior flagella, an undulating membrane bounded by a marginal and basal fibril, and an axostyle, all of which originated in an anterior basal granule. The marginal fibril of the undulating membrane terminated at the end of the membrane and did not continue as a free flagellum. This species was considered to resemble most closely previous descriptions of *T. gallinarum.*

The species found in the intestine averaged 7·3μ by 4·3μ and had only three anterior flagella. The fibrils of the undulating membrane were better developed than in the mouth species, and the marginal fibril was continued as a free trailing flagellum. In neither species could a cytostome be detected. No disease was recognized which could be ascribed to these organisms, and experimental infection of clean fowls failed to produce any symptoms. Though the organism of the mouth is commonly associated with the pox-diphtheria syndrome it is probably only a commensal organism.—U. F. RICHARDSON.

SCHERLE, H. (1938). Untersuchungen über die Trichomonaden des Hausgeflügels, insbesondere des Haushuhnes. [**Trichomonads in Poultry, Especially in Fowls**].—*Inaug. Diss., Giessen.* pp. 54. 5 figs. on 1 plate, 7 tables. [Numerous refs.]

S. examined the respiratory and digestive as well as certain other organs of fowls, ducks, and geese for the presence of trichomonads. They were rarely found on the upper respiratory mucosa of healthy fowls and never on that of ducks and geese. They were present in a few fowls affected with roup.

In the digestive tract trichomonads were found in about half of all the healthy fowls and ducks. The organisms were of two kinds, one with four flagella and a short undulating membrane from the respiratory tract and throat, and one with three flagella and a long undulating membrane from the lower digestive tract.

Specimens of the genus *Bodo* were also found in the respiratory and alimentary tracts of some of the healthy and sick fowls.

The microscopic and cultural methods used are fully described. Locke-egg-serum medium was found most reliable for culture work.

A few attempts to set up localized disease in fowls by cultured trichomonads were unsuccessful.—J. E.

WEST, J. L. (1940). **Coccidiosis of Domesticated Animals and Fowls.**—*J. Amer. vet. med. Ass.* **96.** 603–606.

A brief review of the subject as applied to cattle, fur-bearing animals, and poultry. Life-cycles, occurrence, pathology, and the questions of immunity, treatment, and preventive measures are dealt with in very general terms. Astringents are recommended for treatment, since they tend to constrict the cells and prevent penetration by the parasites. Tannic acid and catechu are said to be beneficial when administered by mouth; alum or tannic acid in 1% solutions are good when given by rectal injection. [This paper makes no claim to be an

original contribution, and there is little new material to be obtained from its perusal.]
—C. HORTON SMITH.

LEVINE, P. P. (1940). **The Initiation of Avian Coccidial Infection with Merozoites.**—*J. Parasit.* **26.** 337–343. 2 tables. [4 refs.]

Eimeria necatrix and *E. tenella* are frequently found together in the caeca on the seventh day of infection, and it is difficult to separate them when pure cultures of one or other are required. *E. necatrix* undergoes the major part of its asexual cycle in the small intestine, whereas the whole cycle of *E. tenella* is confined to the caeca, or to the intestinal mucosa at the junction of the caeca with the intestine.

The infection of clean birds with merozoites is a method of separating these species. L. claims to have produced pure-line infections with five species by this method. Suspensions of merozoites were obtained by killing infected birds a day or two before the formation of oocysts, and scraping the infected mucosa of the intestine or caecum into physiological saline at 42°C. This suspension was used immediately for dosing other birds by injection either into the crop or intestine, or *via* the cloaca. Merozoites of *E. maxima*, *E. nagani*, *E. praecox*, and *E. necatrix* produced infection when injected into the crop and intestine of clean birds. Merozoites of *E. tenella* caused infection only when injected into the caeca through the cloaca or, by the mouth, directly into the intestine; they did not survive the passage through the acid contents of the crop.

L. noted that the time required for the development of oocysts when infection was interrupted in one bird and transferred to another was equal to the duration of the life-cycle in a single host. [L. believes that infection by merozoites may occur under favourable conditions in the field. This may be true in cannibalism, except with *E. tenella* whose merozoites would not survive the crop. It seems improbable that any merozoite could survive prolonged isolation from the host. On the other hand, merozoites may have been responsible for infections which some observers claim to have produced with unsporulated oocysts.]—C. HORTON SMITH.

VELICK, S. F., & SCUDDER, J. (1940). **Plasma Potassium Level in Avian Malaria.**—*Amer. J. Hyg.* Sect. C. **31.** 92–94. 3 tables. [12 refs.]

The authors report the consistent finding of a marked increase in the plasma potassium level in canaries artificially infected with *Plasmodium cathemerium*. Concurrent with the experiment, analyses were made of the blood of ducks infected with a strain of *P. cathemerium*, and of the blood of chickens infected with *P. lophurae*. The plasma potassium level in the infected canaries was found to be almost double that found in normal birds, and in two cases approached a level capable of producing toxic symptoms in mammals.

Despite the low-grade infection produced in ducks, a definite increase in plasma potassium was found. No potassium increase was detected in the chickens. The origin of this extra potassium is at present obscure, but the authors suggest that the chief source is probably the haemolysed red cells.—G. C. BRANDER.

HEGNER, R. (1940). **A Note on the Development of Acquired Immunity in Avian Malaria.**—*Amer. J. Hyg.* Sect. C. **32.** 24–26. 1 fig. [1 ref.]

H. finds after studying infections in canaries with different species of *Plasmodium*, that resistance to the parasite is acquired progressively and rapidly throughout the course of the infection and is very little greater at and after the peak than before. A graph is included, which shows the rise and fall in parasite number in a canary infected with the Hartman strain of *P. cathemerium*.

This finding is not typical of previous reports, the impression having been generally conveyed that resistance to the parasite is developed suddenly at what may be termed the crisis.—G. C. BRANDER.

MANWELL, R. D. (1939). **Toxoplasma or Exoerythrocytic Schizogony in Malaria?**—*Riv. Malariol.* **18.** 76–88. 19 figs. on 4 plates, 1 table. [Numerous refs.] [In English: Italian summary].

M. discusses the evidence as to whether the protozoan parasites which occur in the large monocytes and other phagocytic cells in bird malaria are the schizonts of the plasmodia or whether they are toxoplasms. He points out that similar forms were described by ANSCHÜTZ in 1910 as part of the life cycle of *Haemoproteus* whilst ZIEMANN may have seen them in *Proteosoma* infections as early as 1898. There is, however, some indication that mixed infections with species of *Plasmodium* may have accounted for their occurrence in association with these other infections.

It is considered that these forms do not resemble the toxoplasms of birds, but are difficult to distinguish from those of mammals, and as it is known that toxoplasms from mice

are inoculable to birds, it is conceivable that the mammalian toxoplasm might occur naturally in birds. The evidence in favour of the alternative assumptions is tabulated, the most serious objection to their acceptance as toxoplasms being that they are undoubtedly schizonts, whilst toxoplasms multiply by binary fission, and no conclusive evidence of schizogony in these parasites has been produced. Whilst it has not been possible to separate them from malaria either by mechanical or mosquito transmission, yet they do not appear in every infected bird, nor are they associated with all strains of an avian malarial species in which they occur. This is explained by suggesting that they are only detectable in very severe infections, which may be due either to the great susceptibility of the bird, or to the virulence of the strain of malaria. It is concluded that the evidence favours the theory of the occurrence of exoerythrocytic forms in avian malaria, but that this has not been proved beyond doubt.—U. F. RICHARDSON.

MOCHTAR, A. (1939). Ueber Mischinfektionen und Antagonismus bei Leptospiren. [**Mixed Infections and Antagonism in Leptospira**].—*Z. ImmunForsch.* **95.** 523–533. 8 tables. [7 refs.]

G. pigs inoculated simultaneously with strains of leptospira isolated from bats, rats, and dogs, all the strains being virulent, died with symptoms of *L. icterohaemorrhagiae* infection, but the organisms recovered from the dead animals gave agglutination reactions corresponding to the bat strain, both the other strains having apparently disappeared.

When a g. pig which was a carrier of a rat strain of leptospira was inoculated with the bat strain it developed serious disease and died. Only the bat strain could be recovered from the carcass.

When suspensions of cultures of two heterologous strains of leptospira were mixed, the presence of both strains could be demonstrated by agglutination tests up to 24 hours, but after two days the presence of one strain only could be detected. There was no regularity in the survival of any one strain.—U. F. RICHARDSON.

SCHÜFFNER, W. (1940). Meerschweinchen als lebende Schnellfilter für verunreinigte Leptospiren-Kulturen. [**Guinea Pigs as Live Rapid Filters for Contaminated Leptospira Cultures**].—*Zbl. Bakt. I.* (*Orig.*). **145.** 341.

Contaminated cultures of leptospira are inoculated intraperitoneally into g. pigs in doses of 0·5–1·0 c.c. Blood is collected by heart puncture ten minutes later, and added to three culture tubes containing 1 % peptone solution and 10 % rabbit serum. A pure culture of *Leptospira* appears in 4–14 days. The method is more reliable than filtering as the organisms do not always pass fine filters. It depends on the fact that leptospira, even non-pathogenic species such as *L. biflexa*, pass rapidly into the blood, whilst bacteria are retained for some time in the peritoneal cavity. —U. F. RICHARDSON.

HIROKI, H. (1939). Ueber die Uebertragung der Leptospirosen auf Mäuse. [**Transmission of Leptospira to Mice**].—*Z. ImmunForsch.* **96.** 396–407. 5 tables. [Numerous refs.]

In view of records of leptospirosis occurring naturally in mice, an attempt was made to infect mice experimentally. Various strains of *L. icterohaemorrhagiae*, *L. autumnalis*, and *L. grippotyphosa*, which had lost their virulence by maintenance in culture, were used in the experiments. It proved possible to revive the virulence of the first two species for g. pigs, but no success was obtained with *L. grippotyphosa*. In mice, however, only fleeting infections were obtained by intraperitoneal injection of the culture strains. With the strains of increased virulence, infection lasting 4–5 days was obtained, yet attempts to passage the strains through mice never succeeded beyond the third sub-passage.—U. F. R.

SCHÄFER, W. (1939). Fortführung von Spirochaeta gallinarum-Stämmen in Eipassages. [**The Maintenance of *Spirochaeta gallinarum* by Passages in Fowl Embryos**].—*Zbl. Bakt. I.* (*Orig.*). **143.** 460–462. [11 refs.]

Attention is drawn to the loss of virulence of spirochaetes when maintained in cultures, and a method is described by which the virulence is preserved and even enhanced by cultivation on the chorio-allantoic membrane of the developing chick embryo. Inoculation of the eggs is recommended after eight days' incubation, the spirochaetes becoming numerous in the blood after 4–5 days, and remaining in the embryo until hatching. Material for subinoculation is collected on the 4th–5th day of development and stored in a refrigerator, where it retains its infectivity for fowls for 21 days, and for eggs up to 50 days. Subinoculation of eggs with material stored for 30 days is recommended.—U. F. RICHARDSON.

DISEASES CAUSED BY VIRUSES

HEINRICH, A. (1938). Neuere Ergebnisse der Virusforschung unter besonderer Berücksichtigung der Schutzimpfung. [**Recent Work on Viruses, with Special Reference to Immunization**].—*Ergebn. Hyg. Bakt.* **21.** 103–156. [Numerous refs.]

A well documented review. Rabies, sheep pox, fowl pox, and foot and mouth disease are included in the special diseases dealt with.

ZIRONI, A. (1939). Sulla importanza della iperrecettività nella patogenesi delle malattie da ultravirus. [**Importance of Hypersensitivity in Pathogenesis of Virus Diseases**].—*IV Congr. int. Pat. comp., 1939.* **1.** 107–124. 2 tables. [In Italian: English, French, German and Spanish summaries. Author's English summary copied *verbatim*].

The part played by hypersusceptibility phenomena in virus diseases is discussed on the basis of an extensive consideration of literature and of the author's researches. Hypersusceptibility may be experimentally produced in order to cause a virus to "take" in an otherwise resistant animal. It may also explain the relapses of a disease with increasing severity of symptoms, occurring independently from an increased virulence of the germs.

The hypersusceptibility may show passive transference; and is to be considered as due to humoral antibodies in many instances, and in others to different cell-mechanisms.

The invasion of some *Proteus* strains in the body of typhus patients may be explained as a process of paraspecific hypersusceptibility, brought about by resemblance in antigenic structure of *Rickettsia* and *Proteus*.

HAAGEN, E. (1939). Ueber das Verhalten der virusartigen Krankheitserreger in vitro. [**Behaviour of Pathogenic Viruses** *in vitro*].—*IV Congr. int. Pat. comp., 1939.* **1.** 3–18. 1 fig. [In German: English, French, Italian and Spanish summaries. English summary copied *verbatim*].

Infectious agents known as virus may be distinguished from bacterial agents in as much as they can live and multiply only in the presence of living cells. They have the behaviour of obligate cell-parasites. On the ground of this knowledge special methods for culture of virus in vitro were devised, starting from tissue-cultures. Different culture-methods are mentioned as well as their application to the study of biological problems: preparation of vaccines, e.g. against yellow fever and smallpox, formation of particular intracellular bodies (inclusions) in some virus diseases, immunity problems, etc. The question whether viruses are living bodies or not is discussed.

KASTLI, P. (1940). Der Einfluss der Maul- und Klauenseuche auf die Milchqualität, speziell auf den Gesundheitszustand der Kuheuter. [**Influence of Foot and Mouth Disease on the Quality of Milk and on the Health of the Udder**].—*Schweiz. Arch. Tierheilk.* **82.** 55–67. 2 tables.

The acute febrile stage of F. & M. disease is marked by a decrease in milk yield with a rise in fat, albumin, globulin and mineral content of the milk, and a fall in casein and lactose. K. found that this alteration was not observed in bulk samples of milk from diseased areas, since presumably only about 10% of such milk came from cows at the height of infection. Bulk milk from infected areas, however, showed a greater amount of sediment than normal on centrifugation, suggesting an increase in the incidence of mastitis in such areas. In 3,344 cows examined before and after an outbreak of F. & M. disease there was a fourfold (from 4–17%) increase in mastitis due to *Streptococcus agalactiae*. The clinical history of some of the herds involved is given in tabular form. The mastitis following F. & M. disease was not merely a flare-up of old-standing cases. New cases are produced and yield readily to therapeutic measures.

The importance of this rise in the incidence of mastitis as a result of F. & M. disease both from the point of view of public health and of the cheesemaking industry is reflected in a report by the Swiss Milk Commission quoted by K. The author emphasizes the need for more extensive measures for the control of mastitis.—J. B. BROOKSBY.

SCHAAF, J., TRAUB, E., & BELLER, K. (1940). Untersuchungen über die Stomatitis papulosa des Rindes. [**Research on Papular Stomatitis of Cattle**].—*Z. Infekt-Kr. Haustiere.* **56.** 85–103. 10 figs. [6 refs.]

This condition was shown by OSTERTAG and BUGGE in 1906 to be due to a filtrable virus; it was easily transmitted artificially and under

natural conditions. The present authors, working at Giessen, describe an outbreak of a similar disease among experimental cattle used for work on trichomoniasis. The lesions consist of papules situated on the muzzle, lips, tongue, and buccal mucosa; they may reach the size of a sixpence and become brownish in colour. Secondary "daughter papules" may form around the older lesions. Healing usually begins after about a fortnight and there is no scarring. Identical lesions were produced experimentally in cattle by scarification of the skin of the muzzle and application of fresh infective material. The same procedure carried out with virus which had been kept in glycerin-saline for several weeks gave rise only to much smaller lesions which commenced to heal after 4–5 days. Passage of this latter material through a cow failed to restore its ability to produce large papules; further passages were not carried out. The loss of virulence with storage in glycerin was confirmed in two other strains of virus and it is suggested that it may be due to destruction by the glycerin of bacteria present in the original infective material; it was not possible, however, to isolate such organisms.

The histological changes in natural and artificial infection are described in detail. Large intra-cytoplasmic inclusions are found in epithelial cells undergoing hydropic degeneration. These inclusions stain readily with eosin, but are not stained by Scharlach R; they appear to be specific.

Infective material was filtered with difficulty through a Berkefeld N candle after three unsuccessful attempts. The filtrate caused typical lesions in a cow on scarification and the disease was successfully passaged to a second animal. Infective material kept for some time in glycerin still contained viable bacteria, diplostreptococci, which appeared very resistant to glycerin. Scarification of a pure culture of these organisms on the muzzle of a cow failed to set up lesions of papular stomatitis.

The presence of virus was demonstrated in the blood in one of four cattle at the height of artificially induced infection (3–4 days after inoculation). The virus appeared to be carried mainly by the blood cells, plasma being non-infective. Attempts to transmit the disease to other species, *viz*, horse, sheep, goat, rabbit, g. pig and mouse, were all unsuccessful. The virus could not be cultivated in the developing chick embryo.

Recovery from infection leaves a high degree of immunity which lasts for at least six months. Experiments on cross-immunization with two different strains were positive, animals infected with the first being resistant to subsequent infection with the second.

Although the disease described in this paper is in the main similar to that recorded by Ostertag and Bugge, the incubation in the latter was considerably longer. The present authors consider, however, that the two conditions are probably caused by the same virus. The virus appears somewhat similar to that of cow pox, from which it differs, however, in its high species specificity, failure to grow in the developing chick embryo, and absence of pustule formation.—E. G. White.

White, B. B. (1940). **Vesicular Exanthema of Swine.**—*J. Amer. vet. med. Ass.* **97.** 230–232 and 237. 5 figs. [5 refs.]

During December 1939, vesicular exanthema of swine reappeared in California. The first known outbreak of this disease occurred in 1932, but the present epizootic, which was the first since 1936, was by far the most serious encountered, and by the end of June 1940, no fewer than 123 farms and 222,500 pigs were affected. All but eight of the affected farms employed swill feeding.

Clinically, the disease in pigs is indistinguishable from foot and mouth disease, but it is not transmissible either to cattle or to g. pigs, whereas it sets up a mild syndrome in equines [see also *V. B.* **5.** 345 and 554]. The incubation period is short, and vesicles have appeared in as little as 24 hours after experimental infection. Recovered animals are immune for a short period lasting at least 46 days, according to experiences gained during the present outbreak. Mortality in young pigs is very high, and there is a considerable setback in the growth and development of fattening pigs which have become infected.

It is concluded that the disease is one of major importance, and likely to be encountered on a large scale in the future. It is important to differentiate the initial outbreak from F. & M. disease, and for this purpose a test should be made on two horses, three g. pigs, two calves, and three or more pigs. The Bureau of Animal Industry paid compensation to owners affected by the 1932 and 1933 outbreaks, but has not done so since.—A. N. W.

Balozet, L. (1939). Filtrabilité du virus de l'anémie infectieuse des équidés. Essai

de détermination de la dimension des particules du virus. **[Attempts to Determine the Size of the Particles of the Virus of Equine Infectious Anaemia].** —*C. R. Acad. Sci., Paris.* **209.** 703–704. [2 refs.]

The virus of E.I.A. passes through collodion membranes of pore size 100 mμ prepared according to Elford, but is retained by membranes of pore size 52 mμ. On this basis the particle is probably between 18–50 mμ in diameter.—R. A. Kekwick.

Gunneman, F. (1939). Några rön angående den infektiösa anemien hos häst. **[Experiences with Equine Infectious Anaemia].**—*Skand. VetTidskr.* **29.** 133-151. 1 graph. [English summary].

G. reports the results of treating horses with 0·5% potassium permanganate with the object of protecting them from E.I.A. at the time when they are turned out on to communal pasture in early summer in Sweden. The horses were given an intravenous injection of 200 c.c. and some were reinjected a week later with the same dose. Results were as follows :– In 1936, none of 81 horses injected contracted the disease, whereas 21 out of 188 untreated animals did. In 1937, 8 out of 154 treated animals and 9 out of 106 untreated became affected. In 1938, no horses were treated, but 14 out of 260 untreated developed E.I.A. Thus a total of 3·4% of treated and 8% of untreated horses became infected.—J. E.

Mohler, W. M. (1939). **Complement Fixation with Chick-Embryo Antigen in Equine Encephalomyelitis.**—*J. Amer. vet. med. Ass.* **94.** 39–43. 3 tables. [3 refs.]

Studies of complement-fixation tests for E.E. are recorded. Antigens prepared by inoculating 11 day-old chick embryos with western type virus, and incubating for 18 hours were used. Titrations by normal complement-fixation test technique were applied to 21 consecutive passages of antigens against stock complement-binding serum. With the exception of the first six passages all of these antigens possessed high antigenic value. Strong positive reactions were obtained with known positive sera of horses immunized against the Western type of E.E., and in a few tests on horses recovered from Western type E.E., strongly positive tests were also obtained. Negative reactions were obtained with antigen prepared from normal chick embryos in tests with sera of naturally affected horses and positive reactions with sera of horses repeatedly immunized by chick embryo vaccine. A few tests with the Eastern and Western types of embryo antigen showed the test to be strongly specific between the two types. The possible use of the test to determine the potency of the curative serum, produced by hyperimmunizing horses, is indicated.—D. D. Ogilvie.

Fothergill, L. D., Dingle, J. H., Farber, S., & Connerley, M. L. (1938). **Human Encephalitis Caused by the Virus of the Eastern Variety of Equine Encephalomyelitis.**—*New Engl. J. Med.* **219.** 411. [Authors' summary copied *verbatim*].

The virus of Eastern type of equine encephalomyelitis has been isolated from and identified as the etiological agent in a fatal human case of encephalitis. A more detailed report of these immunologic and pathologic studies will be published in the future.

I. Remlinger, P., & Bailly, J. (1939). Recherche du virus de la maladie d'Aujeszky dans les membranes et milieux transparents de l'oeil. **[Virus of Aujeszky's Disease in the Membranes and Transparent Media of the Eye].**—*Bull. Acad. vét. Fr.* **12.** 365–368.

II. Remlinger, P., & Bailly, J. (1940). Sur la présence des virus rabique et pseudo-rabique dans les membranes et milieux de l'oeil. **[The Presence of the Virus of Rabies and Aujeszky's Disease in the Membranes and Media of the Eye].**—*Ann. Inst. Pasteur.* **64.** 40–46. [4 refs.]

I. Continuing experiments on similar lines to those carried out on the transmission of rabies virus [see *V. B.* **10.** 514.] the authors obtained parts of the eyes of dogs, cats, and rabbits which had died from Aujeszky's disease and inoculated them into rabbits, subdurally into the anterior chamber of the eye, and into the crural muscles. With the choroid 9 experiments gave 8 positive results and with the retina 13 experiments gave 6 positive results. A first series of experiments with the vitreous humour gave 3 positive and 1 negative result, but a later series of 16 experiments, in which special precautions were taken to avoid any part of the choroid pigment finding its way into the vitreous humour, gave all negative results. In experiments with crystalline lens and the aqueous humour (18 in each case) all

the results were negative. Examples of the experiments are given in detail.

II. A précis is given of the work done by the authors on the presence of the viruses of rabies and of Aujeszky's disease in the various parts of the eye and the results obtained are compared and contrasted. Rabies virus may be present in the retina, the choroid, the vitreous humour, and occasionally in the crystalline lens, but the virus of Aujeszky's disease is found only in the choroid and in the retina. While the rabies virus is found almost constantly in the retina and the Aujeszky's virus similarly in the choroid, the former can be isolated in only about 50% of cases from the choroid and the latter in about 50% of cases from the retina. In neither disease is the virus present in the aqueous humour and it is suggested that the positive results claimed by other workers in transmission experiments with the aqueous humour have not been due to the presence of the virus but to contaminating organisms.—J. R. LAWSON.

JONNESCO, D., & ZUGRAVESCO, I. (1939). La cholestérine dans le sérum sanguin et les lipoïdes totaux dans les organes, au cours de la maladie d'Aujeszky. [**Cholesterol Content of Blood Serum and Total Lipoids in the Organs during Aujeszky's Disease**].—*C. R. Soc. Biol. Paris.* **130.** 581–583. 2 tables. [2 refs.]

Rabbits were infected with the virus of Aujeszky's disease and the cholesterol content of the blood serum determined before and after infection; after death certain organs were removed, dried and analysed for total lipoid content. The main findings were a considerable rise in blood cholesterol as the disease develops, an increase in the lipoids of the heart and liver and a slight decrease in the lipoid content of the brain, as compared with normal control animals.—ALFRED EDEN.

SCHWEINBURG, F. (1937). Neuere Ergebnisse der Tollwutforschung. [**Recent Work on Rabies**].—*Ergebn. Hyg. Bakt.* **20.** 1–154. 11 tables. [Numerous refs.]

A comprehensive extensively documented review.

LEACH, C. N., & JOHNSON, H. N. (1940). **Human Rabies, with Special Reference to Virus Distribution and Titer.**—*Amer. J. trop. Med.* **20.** 335–340. 1 graph.

A description is given of six fatal cases of human rabies. In three of these complete pathological studies were made and virus distribution ascertained. Intracerebral mouse inoculation of a 10% suspension of kidneys, liver, spleen, and adrenal gland, in distilled water, failed to show the presence of virus. The lachrymal gland was positive in two instances and the salivary gland in one. The titre of the virus in the various parts of the brain and spinal cord was ascertained by mouse inoculation and is shown in graph form. Attempts to show the presence of the virus by inoculating mice intracerebrally with spinal fluid from each of the six cases, with undiluted blood from two, and with serum from one, all gave negative results.—J. R. LAWSON.

REMLINGER, P., & BAILLY, J. (1940). Essai d'interprétation de la perte de virulence des moelles du traitement pasteurien. [**Attempt to Account for the Loss of Virulence of Spinal Cords Used for the Pasteur Treatment of Human Beings against Rabies**].—*Bull. Acad. vét. Fr.* **13.** 65–68. [1 ref.]

The infected spinal cord of rabbits used by Pasteur lost its virulence at about the sixth day after drying at 23°C. in the dark. After some 2,000 passages made since 1884 it loses virulence at the third or fourth day. That the virus was destroyed by drying had become almost a dogma. The authors have shown that desiccation does not destroy the virus, but that it even conserves it and enables the virus to resist temperatures that were formerly considered destructive, *e.g.* 103° and 104°C. In the present paper the authors discuss the loss of virulence. Rapid desiccation enables the virus to resist temperatures higher than 23°C. Cellular ferments exist in the body and become proteolytic after death in the presence of moisture. It is suggested that these ferments destroy the virus. A certain degree of humidity is necessary for the action of the ferments in the infected spinal cord of rabbits; proteolysis is most intense in the first few hours of drying, and when the tissue is completely dry the action ceases. The destruction of virus runs parallel to the proteolytic action. The work of various authors affords proof of the sensibility of rabies virus to proteolytic ferments.—S. J. GILBERT.

THOMAS, A. D. (1939). **Progress in the Diagnosis and Control of Rabies.**—*S. Afr. med. J.* **13.** 763–765. 1 table. [6 refs.]

T. stresses the necessity for everything

possible to be done to check the disease while it is still limited in extent. Where proper control can be exercised too early destruction of suspected clinical cases in animals is deprecated as proper observations cannot be made. The value of the mouse as a diagnostic animal is emphasized, as large numbers can be used, diagnosis can be made earlier, and inoculated mice that remain healthy need only be kept for 21 days instead of 90 days as with rabbits. The operation of inoculation is simpler and the hippocampus and midbrain can be got into one section when searching for Negri bodies. Although the complete eradication of meerkats cannot be effected by gassing them in their burrows, work on their destruction in outbreaks is being carried out with the aim of destroying centres of infection and meerkats in the immediate neighbourhood. The burrows may be occupied again but the infection should have disappeared.—E. M. Robinson.

Proca, G., & Bobes, S. (1940). **Anti-Rabic Immunization: Living Vaccines and Killed Vaccines.**—*Bull. Hlth Org. L.o.N.* **9.** 79–130. [Numerous refs.]

It was formerly believed that, in order to obtain complete immunity to rabies, it was essential to employ virulent cords. For some years past, however, there has been a tendency to replace living vaccines by avirulent (Pasteur) vaccines, and the authors consider the questions which have arisen, as to whether any special indications and contraindications attach to the vaccines and whether the immunity which the avirulent vaccines with chemical preservatives are able to confer is not established as speedily and as solidly as that obtained with live vaccines. Factors likely to affect the efficacy of treatment are discussed in detail. These include (1) the rabies virus itself, and (2) the incubation period. In countries where rabies is prevalent, epizootic outbreaks occur almost uninterruptedly and appear to strengthen the pathogenic action of the virus. The pathogenic power of street virus was studied experimentally in 389 cases of canine rabies. Intracerebrally inoculated rabbits died after varying incubation periods, as follows:–less than 10 days after inoculation in 23 cases, from 10–15 days after in 140 cases, from 16–25 days after in 178 cases, and in more than 25 days after in 48 cases. The shortest incubation period noted was 5 days. In a further series of 30 cases of paralytic rabies (wolf, horse, cat, and 27 dogs) which were examined, incubation periods of 6–7 days were found in three cases, of 10–15 days in 15 cases, of 16–30 days in 10 cases, and of 47 days in 2 cases.

Amongst other findings which are discussed in detail, and illustrating which examples from different sources are quoted, are:–(1) that the constancy of the essential characteristics of the street virus is not absolute, and (2) that the capacity of the virus to travel along the nerve from the periphery to the nerve centres is not always on a par with its virulence. The remainder of the paper is concerned with the virulence of fixed virus, and the authors conclude by asking whether there is any valid reason for having recourse to live vaccines and accepting the risks which they involve. Statistical evidence is advanced in connexion with the several points raised.—J. R. Lawson.

Habel, K. (1940). **Factors Influencing the Efficacy of Phenolized Rabies Vaccines. I. Strains of Fixed Virus.**—*Publ. Hlth Rep., Wash.* **55.** 1619–1631. 4 figs., 2 tables. [17 refs.] [Author's summary copied *verbatim*].

Marked variations were found in the properties of 25 substrains derived from the original Pasteur strain.

Immunizing power of strains seemed related to their ability to resist phenol, to the rapidity of their passage transfer, and possibly to the length of the incubation period in rabbits.

High immunizing potency is not an inherent characteristic of any particular strain but apparently can be increased or decreased during its passage transfers over a long period of time.

Laboratories manufacturing rabies vaccine should investigate the properties of their rabies fixed strain periodically.

I. Wyckoff, R. W. G., & Beck, C. E. (1940). **The Potency of Anti-Rabic Vaccines.**—*J. Immunol.* **39.** 17–23. 5 tables. [1 ref.]

II. Webster, L. T., & Casals, J. (1940). **A Dog Test for Measuring the Immunizing Potency of Antirabies Vaccines.**—*J. exp. Med.* **71.** 719–730. 1 fig. on 1 plate, 8 tables. [6 refs.]

I. Recent research has suggested that many of the antirabies vaccines now being sold may have little antigenic value. The authors, continuing the work of Webster [*V. B.* **9.** 88; **10.** 26 and 254.] carried out experiments in an attempt to obtain a satisfactory routine mouse

test of vaccine potency, and were able to demonstrate that considerable variation may exist in different batches from a single manufacturer. They are convinced from the results obtained (these are shown in tabular form), that the mouse test can provide a reliable way of evaluating different vaccines and of distinguishing superior from inferior lots. The recommended test is carried out as follows :– Swiss mice are vaccinated intra-abdominally five times at daily intervals. Twelve days after the first vaccination, virus (usually 100 and 1,000 M.L.D.) is inoculated intracerebrally, five vaccinated mice being used to each dilution of virus. Reading of the test is carried out two weeks after the virus injection. Details are given of the vaccine dose and of the virus inoculum.

II. A description of a test in dogs is given, developed along the pattern of the mouse test and having for its objects—(1) the checking of the results obtained in the mouse, and (2) the testing of various antirabies vaccines under conditions as nearly as possible approaching those in the field. Five-month-old beagle dogs were vaccinated with different types of commercial canine antirabies vaccines and three weeks later were tested for immunity by the injection of 0·25 c.c. of virus, properly diluted, into the neck muscles of each side. The results of the dog test closely paralleled those of the mouse test. It was found that phenolized vaccine found to be negative in mice proved likewise negative in dogs, and that chloroformized vaccines giving irregular results in mice also proved the same in dogs. Larger doses than the standard of chloroformized vaccines injected intraperitoneally proved effective, though irritant, in both mice and sheep.

The experiment establishes the reliability of the mouse test as a simple, inexpensive, and practical instrument for the routine commercial and experimental testing of antirabies vaccines.
—J. R. LAWSON.

GIRARD, G., & MILLIAU, M. (1940). Décentralisation du traitement antirabique et vaccins phéniqués. [**Decentralization of Antirabic Treatment and Phenol Vaccines**].—*Bull. Soc. Path. exot.* **33.** 137–139.

Antirabic treatment with dried spinal cord has been less successful in Madagascar than in France especially amongst natives, probably owing to multiple injuries being inflicted by stray dogs. The desirability of producing a vaccine that permits decentralization of treatment has led to comparative experiments being carried out with phenolized vaccine during the past few years. Tests were made on rabbits with controls, which invariably succumbed to the test dose. Fermi's vaccine consists of a 5% emulsion in 1% phenol saline maintained at 22°C. for 24 hours and then kept at 2°–4°C. Semple's vaccine differs from Fermi's in being incubated at 37°C. for 24 hours before being transferred to the ice room. Fermi's vaccine was found to protect 16 out of 18 animals (88·8%), Semple's protected 11 out of 17 (64·7%) and dried cord 14 out of 18 (77·7%). Fermi's vaccine is virulent for rabbits for 40 days after preparation if ground up by hand, but it is inactivated if Lepine's apparatus is used. Semple's vaccine may also be virulent unless Lepine's apparatus is used. Phenolized vaccine is now being substituted for dried cord and so far no failures have been reported, but further experience is required.—S. J. GILBERT.

BRUNI, A., & BUDA, L. (1939). Azione della paraminofenisulfamide sul virus fisso della rabbia e sul virus vaccinico. [**The Action of *p*-Aminophenylsulphamide on Fixed Rabies Virus and Vaccinia Virus**]. —*Settim. med.* **27.** 1131–1133.

The authors investigated the effects of *p*-aminophenylsulphamide on fixed rabies virus and vaccinia virus. Suspensions of 0·5% and 1% of fixed rabies virus to which *p*-aminophenylsulphamide was added in a percentage of 2·5 and 5 were kept at laboratory temperature and inoculated into g. pigs at various intervals.

Vaccinia virus was diluted in equal parts with solutions of 2·5 and 5% *p*-aminophenylsulphamide, and various dilutions were inoculated into rabbits after 24, 48, and 96 hours. In neither case did the drug have any inhibitory action on the virus.—E. MARTIN.

GREEN, R. G. (1940). **Differentiation of Viruses of Canine Distemper and Fox Encephalitis.**—*Vet. Med.* **35.** 365.

Fox encephalitis virus is responsible for outbreaks of disease among red and silver foxes. Experimentally, it is pathogenic for the dog and wolf, but not for the ferret or mink. In dogs, F.E. virus sets up a condition strikingly similar to uncomplicated canine distemper infection, but so far no field outbreak of disease in this species has been traced to it. On the other hand C.D. as well as F.E. is responsible for epizootics on fox farms.

Apart from their different pathogenicities for

laboratory animals, the two viruses may be distinguished by the nature of their inclusion bodies. Those of C.D. occur in all susceptible species, and are usually cytoplasmic; they are found in the epithelium of the respiratory and intestinal tracts, in the bile ducts, in the renal pelvis, and in the bladder. F.E. inclusion bodies are always nuclear, and occur for the most part in cells of endothelial origin, such as those lining the smaller blood vessels, and in the hepatic cells. Further differences are presented in tabular form.—ALASTAIR N. WORDEN.

RIVERS, T. M., WARD, S. M., & BAIRD, R. D. (1939). **Amount and Duration of Immunity Induced by Intradermal Inoculation of Cultured Vaccine Virus.** —*J. exp. Med.* **69.** 857–866. 4 tables. [6 refs.] [Authors' summary copied *verbatim*].

Continued cultivation of vaccine virus in a medium consisting of minced chick embryo tissue and Tyrode's solution has resulted in a virus qualitatively changed to such an extent that considerable amounts of it can be injected intradermally into human beings without danger or inconvenience.

Individuals who are vaccinated intradermally with the cultured virus should be revaccinated dermally six months to a year later with a potent calf lymph virus in order to obtain a satisfactory immunity to smallpox without being subjected to the dangers and inconvenience associated with primary vaccinations with calf lymph virus.

TULLOCH, W. J. (1939). **Observations on the Virus of Influenza with a View to Elaborating a Simple Diagnostic Test Whereby its Presence in the Respiratory Tract of Man may be Revealed. Parts I–V.**—*Edinb. med. J.* **46.** 117–143, 200–211, 278–297, 340–361 and 415–438. 40 tables. [Extracts from author's conclusions copied *verbatim*].

Piglets can be infected with the "human varieties" of the influenza virus. By immunising these animals with infected tissue derived from the same species, antiserum can be prepared which fixes complement in presence both of mouse-lung antigen and culture antigen.

The production of such complement fixing antiserum by a method which precludes the development of hetero-antibodies in the immunised animals corroborates the view that complement fixation with convalescent human serum is due to the presence therein of antibodies specific to some product of the influenza virus. The experiments in which infected pig lung was employed as antigen strongly suggest that the complement fixing antigen is not the virus *per se* but is only a product thereof. This product is elaborated only under certain conditions, which are so far undefined.

It is possible by concentration—desiccation from the frozen state—followed by removal of electrolytes by dialysis and final reconstitution thereafter, to enhance specifically and quantitatively, the complement fixing property of products possessed thereof.

Complement fixation tests using three strains of influenza virus—the W.S., "Bur," and "Tal" strains—indicate that these cannot be readily differentiated by *in vitro* methods. This finding was to be expected in view of the fact that such methods fail to differentiate between human and porcine strains.

In view of the fact that the complement fixing antigen appears to be common to different strains of the influenza virus, a multiplicity of antisera should not be required to examine morbid material by the complement fixation method.

NELSON, A. A., & OLIPHANT, J. W. (1939). **Histopathological Changes in Mice Inoculated with Influenza Virus.**—*Publ. Hlth Rep., Wash.* **54.** 2044–2054. 12 figs. [8 refs.] [Authors' summary copied *verbatim*].

Intranasal instillation of the PR8 strain of influenza virus, as carried on in this study, produced in mice an edematous pneumonic process which was fatal in about 4 days in 80 to 90 percent of the mice. Study of 57 test mice showed that, in general, at 1 day after inoculation there was a focal polymorphonuclear exudation in the smaller bronchi, and a few small peribronchial alveolar foci of polymorphonuclears; there was an early stage of damage to the bronchial epithelium, and practically no septal infiltration. At 2 days the process was not much greater in extent, but the polymorphonuclear exudate was in large part necrotic, and damage to the bronchial epithelium was greater; perivascular edema and peribronchial and perivascular infiltration, chiefly with small mononuclear cells, were appearing. At 3 days to 4 days, when the animals began to appear ill, a diffuse edema appeared, together with a slight to moderate diffuse septal and alveolar infiltration with an

exudate of about two-thirds small mononuclear cells and one-third polymorphonuclears; the bronchial epithelial damage had progressed to the point where small areas were denuded, and there was more peribronchial and perivascular infiltration. Animals not dying within 3–6 days nearly always lived indefinitely thereafter, with persisting clinical symptoms and varying degrees of chronic pneumonic processes; squamous epithelial metaplasia in the alveoli was a prominent feature and bronchial epithelial damage persisted. The changes in the trachea were similar to those in the bronchi but less marked. Of 30 control animals, 23 showed no lesions and in the remaining 7 there were very minor lesions as compared to those in the test animals.

The noses of 26 test animals were examined; the respiratory and olfactory epithelia showed no lesions in any; in 5 mice there was slight focal mononuclear and polymorphonuclear infiltration of the lamina propria of the mucosa; the noses of 18 control mice showed no lesions. Slight lesions were present in the liver, spleen, thymus, and kidney in the test animals, with none in the adrenal, brain, thyroid, heart, pancreas, or gastrointestinal tract. Small series of mice given conjunctival or intraperitoneal inoculations of virus showed more lesions than did control animals, although these additional lesions were slight and in no case were the animals ill.

I. TAYLOR, R. M., & DREGUSS, M. (1940). **An Experiment in Immunization against Influenza with a Formaldehyde-Inactivated Virus.**—*Amer. J. Hyg.* Sect. B. **31.** 31–35. 1 table. [11 refs.]

II. TAYLOR, R. M., DREGUSS, M., & DE RITIS, F. (1940). **Antigenic Behavior of Certain Hungarian Strains of Epidemic Influenza Virus.**—*Ibid.* 36–45. 3 figs., 2 tables. [8 refs.]

I. A vaccine prepared at the National Institute for Medical Research, London, by LAIDLAW, SMITH and ANDREWES, consisting of a gradocol membrane filtrate of a 5% suspension of mouse lung infected with W.S. virus and inactivated by 1 : 5,000 formaldehyde, was inoculated (one injection) into selected groups of the Hungarian population prior to the outbreak of an influenza epidemic. 306 persons were vaccinated, and 336 kept as controls. Samples of sera taken before and after inoculation showed significant rises in antibodies against the W.S. strain.

During the mild outbreak which subsequently developed, 14 (4·6%) of the vaccinated, and 20 (6%) of the controls contracted influenza, ferret-pathogenic viruses being obtained from both groups. The strains isolated were, however, antigenically different from W.S. virus, a fact which may have accounted for the apparent ineffectiveness of the vaccine.

II. Five of the strains isolated from the epidemic mentioned in 1 were compared with W.S., P.R.8, and Shope swine influenza viruses. The results of neutralizing tests using ferret-immune serum and infective mouse lung, showed that the swine virus was not neutralized by any of the other sera: conversely, swine-immune serum was ineffective against any of the human strains. W.S. and P.R.8 viruses differed from one another and from the Hungarian strains. Cross-immunity tests in mice tended to confirm these findings, since vaccination induced a strong protection against the homologous strain while resistance to the heterologous viruses was only partial. It is suggested that strain differences are more manifest when the immunity is of a relatively low order, and that as protection to the homologous strain is increased, heterologous immunity is also raised.

The observations seem to confirm differences in antigenic qualities among strains of human influenza virus. The bearing of strain divergencies on vaccination is discussed.—R. E. G.

TSURUMI, M., OGASAWARA, K., & TAKAGI, H. (1939). **Studies on Influenza Virus (First Report).**—*Nagoya J. med. Sci.* **13.** 61–67. [11 refs.]

Owing to the absence of a supply of ferrets, the authors tested the susceptibility of locally available animals. The Corean squirrel, *Sutanias aeiaticus orientalis* was susceptible, and the Manchurian squirrel, *Citellus mongolicus umbiatus* was more so.

MOTE, J. R., & FOTHERGILL, LeR. D. (1940). **The Effect of Human Strains of Hemophilus Influenzae on Influenza Virus Infections of Swine.**—*J. Bact.* **40.** 505–516. 3 figs., 2 tables. [18 refs.] [Authors' summary copied *verbatim*].

The possible existence of a concerted or synergistic action between known human strains of *Hemophilus influenzae* and two influenza virus strains has been investigated in swine.

In no instance has a significant symbiotic

action been demonstrated between the bacterial and the virus strains studied.

The inability of human strains of *H. influenzae* to establish themselves in the respiratory tract of swine suggests a possible biologic difference between human and swine strains of *H. influenzae*.

IGUCHI, M. (1939). **On the Spontaneous Encephalomyelitis of Mice and Its Virus.** *Kitasato Arch.* **16.** 56–78. 19 figs. on 5 plates. 10 tables. [8 refs.] [In English: abst. from author's summary].

In studies on epidemic encephalitis a virus was isolated from mice which produced nervous symptoms in mice different from those of that disease, although the pathological changes in brains and spinal cords were similar.

Fifteen mouse passages were made with this mouse virus by intracerebral inoculation with emulsions of spinal cords of infected mice. The chief symptom observed in infected mice was the occurrence after an incubation period varying from 5–30 days or over of flaccid paralysis beginning in one of the hind legs and extending to the other legs, and due to perivascular infiltration, accumulation of glia cells, and degeneration of nerve cells in the brain trunk and spinal cord. Some mice, which showed no symptoms even after intracerebral inoculation of concentrated virus were mildly infected, the virus or histopathological changes being found in the spinal cord or brain. The paralysis in the surviving mice disappeared gradually in slight cases, but usually it persisted. The virus was recovered from the spinal cord of these mice, but it gradually lost virulence. It passed through a Chamberland L_3 filter and survived for 43 days in 50% glycerin in an ice chest.

A few mice became paralyzed after intranasal, subcutaneous, or intraplantar inoculation of the virus. Paralysis did not result from oral, intravenous, intraperitoneal, or inoculation into the intrasciatic nerve. When bouillon was injected intracerebrally immediately after intraperitoneal inoculation of virus, however, about one-half of the mice showed paralysis.

The virus was invariably found in the brain and spinal cord of mice showing paralysis after intracerebral inoculation. In one animal the virus was also found in the cervical lymph nodes and the liver. No virus was recovered from lungs, spleen, kidneys, adrenals, or whole blood. It was not clear whether or not an immunity was developed in mice showing no symptoms following intracerebral inoculation. Slight immunity to a subsequent intracerebral injection of virus was developed after intranasal, intraperitoneal, or subcutaneous immunization. Weak antibody was demonstrated in sera of convalescent mice and of rabbits inoculated intraperitoneally with a large dose of virus.

The virus differs from the virus of epidemic encephalitis, but it may be identical with that of spontaneous encephalomyelitis of mice reported by THEILER.

CHUMAKOV, M. P., & SEITLENOK, N. A. (1940). **Tick-Borne Human Encephalitis in the European Part of USSR and Siberia.**—*Science.* **92.** 263–264. [7 refs.]

A form of human encephalitis occurring in the Soviet far East has been shown to be transmitted by the bite of *Ixodes persulcatus*. The virus can be transmitted by the tick at all stages of its development including the larval, and passes from adult to larva through the egg. Neutralizing antibodies have been found, in European Russia and Siberia, in the serum of human beings who have recovered from various types of poliomyelitis, meningitis, and encephalitis, and it is suggested that the disease may be more widespread than is at present suspected. Strains of the virus have been isolated from hares and squirrels, and it is transmissible to mice. All strains, whether human or animal, appear to be immunologically identical.

—U. F. RICHARDSON.

KING, L. S. (1940). **Experimental Encephalitis. Some Factors Affecting Infection with Certain Neurotropic Viruses.**—*J. exp. Med.* **72.** 573–593. 3 figs., 11 tables. [Numerous refs.] [Author's summary copied *verbatim*].

The action on mice of several neurotropic viruses was studied with reference to factors which influence infection.

With pseudorabies virus, section of the sciatic nerve with inoculation into the ipsilateral foot pad significantly retarded the speed of infection. The virus ascended other nerves of the leg, but at slower rate. It would appear that the number of nerve fibers available for passage may play a rôle in the speed with which infection occurs with this virus.

When pseudorabies virus was inoculated into an area of inflammation its effects were markedly lessened. Similar experiments with unmodified equine encephalomyelitis virus which, unlike

pseudorabies, does not ascend along local nerves, showed no impedance of infection.

Brain trauma did not change the rate of infection with the viruses of St. Louis encephalitis, herpes, or pseudorabies. But intraperitoneal injection of glycerine, followed by intramuscular inoculation of St. Louis virus, resulted in marked facilitation of infection, as already remarked of fixed equine encephalomyelitis virus. This phenomenon did not occur with pseudorabies or herpes. In contrast to certain other viruses, pseudorabies and herpes viruses were only slightly more effective in young mice than in adults.

With St. Louis virus, as with fixed equine encephalomyelitis viruses, inoculation into the eye or nose was far more effective than other peripheral routes. This was not the case with pseudorabies. Herpes, however, also showed greater sensitivity of the intranocular route.

After injection into the eye, St. Louis and fixed equine encephalomyelitis viruses invaded the optical pathway, while herpes and pseudorabies avoided the optic fibers and attacked the trigeminal nerve. These phenomena are discussed in the light of cellufugal and cellupetal progression of viruses.

The similarities in the action of fixed equine encephalomyelitis and St. Louis encephalitis viruses are discussed and contrasted with herpes and pseudorabies.

WESEMEIER, K. (1938). Beobachtungen über Louping-ill beim Menschen. [**Louping-Ill in Man**].—*Dtsch. Arch. klin. Med.* **182.** 451–454. [3 refs.]

Description of a case of louping-ill in a woman who had worked with the virus in a laboratory.

DYER, R. E. (1939). **Similarity of Australian "Q" Fever and a Disease Caused by an Infectious Agent Isolated from Ticks in Montana.**—*Publ. Hlth Rep., Wash.* **54.** 1229–1237. 6 figs., 1 table. [12 refs.] [Author's summary copied *verbatim*].

The points of similarity and dissimilarity between the Montana infection and the "Q" fever of Australia may be summarized as follows :–

Epidemiology.—"Q" fever has been recognized principally in persons associated with animals, which suggests infection from direct contact with infected animal tissues or with animal parasites.

The epidemiology of the Montana infection is unknown, but the presence of the virus in ticks suggests that human infections may be found in rural areas.

Clinical.—The one recognized human infection with the Montana virus was very similar to the published descriptions of the Australian "Q" fever cases.

Susceptibility of animals.—As far as work has been carried out, the only point of difference in susceptibility of animals to the two infections is the failure of the American workers to find the monkey susceptible, in contrast to the success in infecting this animal in Australia.

The susceptibility of rabbits has not been studied thoroughly enough to warrant definite statement.

Serology in man and animals.—Neither disease has been found to produce agglutinins for *Proteus* X strains. It should not be forgotten that the opportunity to study this point in human beings in this country has been limited to one case.

Reactions in guinea pigs.—The clinical pictures in guinea pigs, as described in the literature, are similar, with the exception that the Montana infection has been reported to produce a definite local skin reaction following subcutaneous inoculation, while the Australian workers state that no particular local reaction follows subcutaneous inoculation. A comparison of the two strains in this laboratory shows that the "Q" fever strain produces general reactions in guinea pigs which, although similar to those produced by the Montana virus, are milder. This fact may be explained by the attenuation of the "Q" virus during transit to this country. Rickettsiae have not been observed in guinea pigs with "Q" fever, while they are present in abundance in guinea pigs infected with the Montana virus.

Cross immunity tests.—These tests are identical, with the exception that epidemic typhus, and, to a lesser extent, endemic typhus apparently produce more immunity to "Q" fever than to the Montana virus.

Agglutination of rickettsia.—In one well-controlled test the serum from one recovered case of the Montana infection gave results identical with one serum from a recovered case of "Q" fever when tested with a suspension of *Rickettsia burneti* prepared in Australia.

Protection tests.—As far as these tests have been tried no immunological difference has been noted between the virus of "Q" fever and that isolated from Montana ticks.

GREVAL, S. D. S., & NICHOLAS, M. J. (1940). **Common Cold Responsible for Grave Suspicion of Rabies in the Dog and a Discussion on Associated Considerations Including Rabies in Mongooses and Bats.**—*Indian med. Gaz.* **75.** 401–404. [18 refs.] [Abst. from authors' summary].

A dog affected with a chill presented for a whole day the clinical picture of a dog affected with rabies. Three other dogs showed the same symptoms. All recovered. Human beings in close contact with such suspicious cases should be given prophylactic antirabies treatment. Isolation and observation of suspected cases, to confirm or refute the diagnosis of rabies, is preferable to destruction of the animals.

COX, H. R. (1939). **Studies of a Filter Passing Infectious Agent Isolated from Ticks. V. Further Attempts to Cultivate in Cell-Free Media. Suggested Classification.**—*Publ. Hlth Rep., Wash.* **54.** 1822–1827. 4 tables. [5 refs.] [Author's summary copied *verbatim*]. [For previous parts, see *V. B.* **9.** 715].

Further attempts to cultivate the filter passing infectious agent isolated from the Rocky Mountain wood tick, *Dermacentor andersoni*, in cell-free leptospira media have failed. It survived in serial passage through six subcultures, but was not demonstrated in later subcultures. In culture tubes kept at 28°C. it survived for at least 109 days with no appreciable loss of infective titer. The name *Rickettsia diaporica* is proposed for this organism.

WEIR, J. M., & HORSFALL, F. L., Jr. (1940). **The Recovery from Patients with Acute Pneumonitis of a Virus Causing Pneumonia in the Mongoose.**—*J. exp. Med.* **72.** 595–610. 7 tables. [20 refs.] [Authors' summary copied *verbatim*].

1. A virus capable of producing pulmonary consolidation in the wild mongoose (*Herpestes griseus*) has been isolated from throat washings obtained from four patients with a clinical syndrome termed acute pneumonitis. 2. The virus was not pathogenic for ferrets, mice, guinea pigs, rabbits, monkeys, voles, hamsters, deer mice, skunks, opossums, or woodchucks. 3. The virus was filterable through Berkefeld V and N candles, was not inactivated by glycerin or by freezing or drying in vacuum, and was propagated for at least 30 serial passages on the chorio-allantoic membrane of the developing chick embryo. 4. Normal mongooses placed in contact with infected mongooses developed pulmonary consolidation. 5. The virus was neutralized by the serum of mongooses convalescent from the infection but was not neutralized by normal mongoose serum. 6. Serum of human beings convalescent from acute pneumonitis also neutralized the virus, but serum obtained from the same individuals during the acute phase of the disease failed to do so. 7. The evidence so far obtained strongly suggests that this virus is the cause of acute pneumonitis in human beings. It differs from other viruses known to cause infections of the respiratory tract in man.

BRIGHAM, G. D., & DYER, R. E. (1938). **Endemic Typhus Fever in Native Rodents.**—*J. Amer. med. Ass.* **110.** 180–183. [Numerous refs.]

A brief annotation in which reference is made to the susceptibility of dogs, cats, hedgehogs, and pigeons, in addition to g. pigs, to infection with the virus of exanthematic typhus. An account is given of rodents which were found to be susceptible in tests carried out. Tests were also made for naturally infected rodents in certain areas in the U.S.A. where cases of human typhus had occurred. It is concluded that the incidence of the disease has increased in the south-eastern part of the U.S.A.

WOOLDRIDGE, W. R., & HIGGINBOTTOM, Constance. (1938). **The Effect of Certain Bacterial Toxins upon some Respiratory Mechanisms of Animal Tissues.**—*Biochem. J.* **32.** 1718–1728. 13 tables. [9 refs.]

The data show that bacterial toxins which contain the α toxin of *Clostridium welchii* exert a specific inhibitory action upon the aerobic oxidation of succinate by aqueous suspensions of various minced tissues such as small intestine, skeletal muscle, liver and kidney. This inhibition is reduced considerably by the presence of antisera which neutralize the toxin. A number of other toxins of the clostridium group showed no inhibition greater than that induced by a precipitate prepared similarly from uninoculated broth.

It is suggested that the pathogenicity of *Cl. welchii* may be associated in part with this inhibitory action of its toxin upon an important respiratory mechanism of tissue.—R. ALLCROFT.

I. GRATIA, A. (1940). Toxicité des ions alcalins Na et K à l'égard de certains

bactériophages. **[Toxicity of Alkaline Ions, Sodium and Potassium, for Certain Bacteriophages].**—*C. R. Soc. Biol. Paris.* **133.** 443–444. [2 refs.]

II. GRATIA, A. (1940). Action antagoniste des ions alcalino-terreux Ca, Mg, Ba et Sr sur la toxicité des ions alcalins Na et K à l'égard de certains bactériophages. **[Antagonistic Action of Calcium, Magnesium, Barium and Strontium on the Toxicity of Alkaline Ions (Sodium and Potassium) for Certain Bacteriophages].** *Ibid.* 445–447. [7 refs.]

I. When employed in certain concentrations, salts of Na and K were found to inactivate two bacteriophages (designated BLS and Meg. C) which normally attack a *Staphylococcus* and *Bacillus megatherium* respectively. The chlorides or sulphates of both elements appeared to exert a maximum effect upon BLS at concentrations of $M/6$. In the case of Meg.C, inhibition was greatest when the solutions employed (chlorides or nitrates) were $M/16$ or $M/8$. At higher or lower concentrations, the effect was less marked or non-existant. Inactivation was brought about also by the use of organic compounds such as the citrate, oxalate, and acetate of K, although in these cases the ranges of effective concentration were much wider.

II. The effects noted in I were not obtained, in the case of Meg.C, when the KNO_3 solution was mixed with an equimolecular solution of $Ca(NO_3)_2$; the same effect was noted when very much lower concentrations of $Ca(NO_3)_2$ were added to the KNO_3. Sr, Ba, and Mg salts also were found to antagonize the action of the KNO_3.—ALASTAIR N. WORDEN.

PARASITES IN RELATION TO DISEASE [GENERAL]

KOFFMAN, M. (1939). Bidrag till kännedomen om parasiter hos husdjur och vilt i Sverige. **[Parasites of Domestic and Wild Animals in Sweden].**—*Skand. VetTidskr.* **29.** 509–585. 64 figs., 1 table. [Numerous refs.] [English summary].

A report on parasitological examinations on every dead animal sent for diagnosis to the Veterinary Bacteriological Institute at Stockholm during the first half of 1938. The animals included fowls, turkeys, capercailzie, foxes, mink, cats, dogs, polecats, martens, nutria, rabbits, hares, and guinea pigs. The protozoan, helminth and arthropod parasites seen are listed and many are described in detail and illustrated. Interested readers should consult the original.—J. E.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

PARMAN, D. C. (1940). **The Development of Research in Preventive Entomology.**—*J. econ. Ent.* **33.** 749–754. 2 figs.

P. advances the thesis that entomological research should aim at preventing the development of destructive insect populations rather than at combating their materialized attacks. A procedure for such research is outlined under the following main heads :- census of insect population, factors affecting insect population, correlation of data, and practical application of plans. The description of the procedure is illustrated by surveys made of *Cochliomyia americana* in Texas.—R. P. HOBSON.

SEN, P. (1940). **A Note on some Ectoparasites of Poultry and their Control.**—*Indian J. vet. Sci.* **10.** 218–222. 6 figs. [1 ref.]

S. describes a severe outbreak of louse (*Menopon stramineum*) infestation, associated with scaly-leg mites (*Cnemidocoptes mutans*) and air-sac mites (*Cytoleichus nudus*), at a poultry farm attached to the Imperial Veterinary Research Institute, Mukteswar. A detailed description is given of the different stages of the insect. It feeds on the barbules of the feathers and causes damage by completely removing areas of feathers. The outbreak was successfully controlled by dipping the birds in a solution containing 0·5% commercial sodium fluoride.—R. P. HOBSON.

SALERNO, A. (1939). Osservazioni biologiche sull' *Hypoderma bovis* nell'Agro Romano. **[Biological Observations on *H. bovis* in the Roman Campagna].**—*Riv. Parassit.* **3.** 171–186. 6 tables. [6 refs.] [English, French and German summaries].

Observations are recorded on the warble infestation of 400 cattle at the Rome zootechnical institute. Comparison of incidence of warble tumours with climatic conditions

seemed to show that infestation was higher when the previous year had been one of abnormally heavy rainfall. It is suggested that rain favours the emergence of larvae from the tumours and also renders soil conditions suitable for pupation and the emergence of the adult flies.

About 78 % of animals infested were under three years old. Only 19·72 % of cases occurred in three-year-old animals, and only 6·5 % in animals four years old or more. Judging from the number of tumours per animal, fine-skinned breeds of cattle are more susceptible than those with coarse skin.

In most years the majority of the tumours appeared in the latter half of March and in April, but in one year the majority appeared in January, and in another year a peak occurred in January followed by a secondary rise in numbers in March. Very few larval tumours appeared after the end of April.

The emergence of larvae from the tumours occurred between February and July. In one year the largest numbers emerged in March, but more usually the time of greatest emergence was May. It was thought that the larvae stayed in the tumours for 2–3 months.

—U. F. RICHARDSON.

SONI, B. N. (1939). **Warble-fly Larva as an Oesophageal Parasite of Goats.**—*Indian J. Ent.* **1.** 95.

Young larvae of *Hypoderma lineatum* occurring under the sub-mucosa were encountered in the oesophagus of a goat.

BROOM, J. C. (1939). **The Maintenance of *Glossina morsitans* in England for Experimental work.**—*Trans. R. Soc. trop. Med. Hyg.* **32.** 633–638. 1 table, 1 chart. [5 refs.]

Methods for small-scale rearing of the tsetse flies *G. morsitans* and *G. palpalis* are known, but often involve individual handling of flies and are not applicable to large-scale rearing. B. describes some simple modifications of the method, by which he has successfully reared from puparia many thousands of flies for experimental work on *Trypanosoma brucei*. Consignments of 2,000 puparia were received fortnightly by air mail from Tanganyika, and about 23 % of these were successfully reared to adults. A life table showing the daily expectation of life of the adult for a period of 35 days after emergence has been constructed for the conditions of maintenance described; from it can be readily obtained the initial number of flies required to give a certain number after a given interval, or conversely the probable numbers available, at different times, from a given number of emergences.—J. MACLEOD.

ZUMPT, F. (1939). Tsetsebekämpfung und Bodenerosion. **[Tsetse Fly Control and Soil Erosion].** — *Tropenpflanzer.* **48.** 317–323. [10 refs.]

It is pointed out that until recent times the control of tsetse has mainly depended on bush clearing which may be undertaken as strip clearings, 1,000–3,000 yards wide, or settlement clearings, several square miles in extent. The removal of the protective vegetation exposes the soil to sun, wind, and rain and in arid areas this exposure is likely to lead to soil erosion. The most drastic clearing is done along river valleys, as it is here that the tsetse flies retire in the dry season, but as a result no vegetation is left to hold the flood water, and erosion of the banks and river valley is produced. In the settlement clearings the cut bush is burnt so that the land can be quickly brought under cultivation, but it has been shown that grass burning impoverishes the land and weakens the vegetation. Also, such fires spread to forest reserves and the slopes of neighbouring hills, and destroy the soil covering where it is most required. Again, settlers in the clearings tend to overstock their land, which also weakens the vegetable covering of the soil. An ideal would be to destroy the tsetse flies and yet avoid bush clearing, and experiments are in progress in this direction in Tanganyika Territory, where it has been shown that, in the case of certain species of tsetse, the prevention of grass burning leads to thicket formation and a rapid decrease in the tsetse population.

It is pointed out that soil erosion is a problem which occurs independently of tsetse control, and that the remedy lies in the improvement of methods of agriculture, the conservation of water, the manuring of cultivated land, the avoidance of overstocking and the preservation of forest reserves.—U. F. RICHARDSON.

ROZEBOOM, L. E. (1940). *Flebotomus suis*, **a New *Flebotomus* from Panama (Diptera : Psychodidae).**—*Amer. J. Hyg.* Sect. C. **32.** 8–11. 5 figs., 1 table. [2 refs.]

A species of *Phlebotomus* found in a pigsty in Panama is described and figured. It belongs to the subgenus *Brumptomyia*, and R. suggests that it may represent a new species; the name *P. suis* is given provisionally, pending determination of its relationship to a Venezuelan species, *P. gomezi* Nitzulescu.—J. MACLEOD.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

CLAPHAM, Phyllis A. (1940). **On Wild Birds as Transmitters of Helminth Parasites to Domestic Stock.**—*J. Helminth.* **18.** 38–44. [5 refs.]

C. shows by controlled experiments with parasite-free domestic poultry that land which for years previously has not carried poultry may contain viable helminth eggs capable of infecting such poultry, especially young chickens. Pens completely wired off from wild birds for four years proved harmless in this respect. *Hymenolepis corvi* of rooks and *Mediorhynchus micracanthus* of starlings were passed to chickens and pheasants respectively, though not normally parasites of gallinaceous birds. A record of wild bird parasites is being kept and the investigation will be continued. —C. V. WATKINS.

I. BALIAN, B. (1940). Studi sulla distomatosi. Nota prima. Ricerche ematologiche e biochimiche in bovini normali ed affetti da distomatosi epatica. [**Studies on Distomatosis. I. The Blood Picture and the Composition of the Blood in Healthy Cattle and in Those with Liver Flukes**].—*Nuova Vet.* **18.** 134–142. 1 table.

II. BALIAN, B. (1940). Studi sulla distomatosi. Nota seconda. Ricerche ematologiche e biochimiche in ovini normali ed affetti da distomatosi epatica. [**Studies on Distomatosis. II. The Blood Picture and the Composition of the Blood in Normal Sheep and Those with Liver Flukes**].—*Ibid.* 154–160.

I. The results are reported of the examination of 26 bovines infested with *Fasciola hepatica*, occasionally associated with *Dicrocoelium lanceolatum*, the degree of infestation being assessed in the living animal by Pataki's method. Six ova of *Fasciola hepatica* found in the faeces were presumed to correspond to 100 adult flukes in the liver. Verification of this estimate by P.M. examination showed the actual number of parasites to be 10 % higher than the estimate in cases of recent infection, and 25 % higher in chronic cases.

Changes found in the blood picture were :– (a) a decrease of 30–35 % in the number of red blood corpuscles ; (b) an increase of leucocytes in recent cases, and leucopenia in chronic cases ; (c) an increase in the number of monocytes in recent, and a decrease in chronic, cases, and (d) reduction of neutrophiles, and increase in basophiles and eosinophiles. The pH and specific gravity of the serum were lowered. The total nitrogen content was increased in recent, and decreased in chronic, cases.

II. An investigation of sheep similar to that of I. The Pataki method was found unreliable. The parasite mainly concerned was *Dicrocoelium lanceolatum*. The changes found in the blood were a considerable and lasting decrease in the number of red blood corpuscles and in haemoglobin, in recent cases a slight and inconstant leucocytosis, slight lymphocytopenia, marked eosinophilia, slight basophilia, and slight increase in the total nitrogen of the serum, and in chronic cases lowering of the specific gravity, pH, and total nitrogen of the serum.—E. MARTIN.

BRUMPT, E., VELASQUEZ, J., UCROZ, H., & BRUMPT, L. C. (1939–1940). Mission E. Brumpt et L.-Ch. Brumpt en Colombie et Vénezuela. 1.—Découverte de l'hôte intermédiaire, *Limnaea bogotensis* Pilsbry, de la grande douve, *Fasciola hepatica*, en Colombie. [**Expedition of E. Brumpt and L. C. Brumpt in Colombia and Venezuela. I. *L. bogotensis* as Intermediate Host of the Liver Fluke in Colombia**].—*Ann. Parasit. hum. comp.* **17.** 563–579. 1 text-fig., 4 figs. on 1 plate. [Num. refs.]

Distomatosis is common in certain areas of Colombia, where 80 % of bovines, 60 % of sheep, and 24 % of pigs are infected. It is found that *L. bogotensis* can act as a vector, but of 122 of the snails dissected during August, only two were naturally infected. An historical review is given of the incidence and geographical distribution of *F. hepatica* and its intermediate hosts under natural and experimental conditions. The usual control measures against the snail hosts are effective.—M. L. BINGHAM.

CAMPBELL, D. H., & MELCHER, L. R. (1940). **Relationship of Sex Factors to Resistance against Cysticercus crassicollis in Rats.** —*J. infect. Dis.* **66.** 184–188. 2 tables. [Numerous refs.]

Two experiments were carried out to show that sex factors influence the infection of rats with *C. crassicollis* [= *C. fasciolaris*]. In the first experiment oncospheres of *Taenia taeniaeformis* were fed to rats following removal of

their gonads. The average number of cysts which developed in their livers indicated that castration tends to increase male resistance, whereas ovariectomy lowers that of female rats. In the second experiment the degree of sex reversal was intensified by administration of an androgen (testosterone propionate) to ovariectomized females and oestrogen (theelin) to castrated males. Oncospheres were then fed to the rats in each group as in experiment I. The females so treated showed a still lower resistance, whilst the resistance of the males was further increased [see also *V. B.* **10.** 263].
—M. L. BINGHAM.

CHOW, C. Y. (1939). Notes sur quelques nématodes de l'Indochine Française. [**Nematodes of French Indochina**].—*Ann. Parasit. hum. comp.* **17.** 21–31. 2 figs. [7 refs.]

By comparison of the caudal papillae of the males, C. concludes that *Ascaris ovis* is a valid species distinct from *A. lumbricoides*. *Ascaridia galli* has been recorded from fowls. The rest of the paper concerns parasites of wild animals.
—E. S.

CAUTHEN, G. E. (1940). **A Method of Culturing Large Numbers of *Haemonchus contortus* Larvae from Eggs in Cattle Feces.**—*Proc. helminth. Soc. Wash.* **7.** 82–88.

C. has found bone charcoal and sterile sheep faeces to be poor media for the cultivation of *H. contortus* larvae. Accordingly he tested the efficiency of sphagnum moss as a medium. Thirty-eight separate faecal cultures were prepared, each consisting of about 2,300 g. of faeces and containing 7·5–10 g. of sphagnum moss to each 100 g. The average percentage of eggs which developed was 54·91, representing 16,000–548,000 larvae per culture.

Other commendable features of sphagnum moss were greater absorption of water and consequent better aeration of the culture (one smaller culture was still moist 142 days after being prepared), little or no tendency towards heating and drying out of the cultures, and reduction of the faecal odour.—A. L. WILSON.

SHORB, D. A. (1939). **Differentiation of Eggs of Various Genera of Nematodes Parasitic in Domestic Ruminants in the United States.**—*Tech. Bull. U.S. Dep. Agric.* No. 694. pp. 10. 2 figs., 1 table. [9 refs.]

Attempts were made to determine whether the eggs of the commoner nematodes of cattle and sheep present sufficiently constant morphological differences to permit a reasonably accurate specific diagnosis. In most cases 100 eggs of various genera were examined in detail and it was found that these eggs can be distinguished by size, shape, characteristics and thickness of the shell, pigment in the cells, and stage of development. A key to the identification of the eggs of 15 genera is given. The paper also includes a full description of a nematode egg and some observations on the effect of various chemicals on the shell and contents of the egg. [See also *V. B.* **11.** 101.]
—A. L. WILSON.

ROBERTSON, D., & FRASER, A. H. H. (1940). **The Influence of a Moderate Worm-Burden on the Growth and Health of Lambs.**—*Emp. J. exp. Agric.* **8.** 323–325. 2 tables.

The authors carried out an experiment to determine whether the worm burden normally carried by healthy lambs may have sufficient harmful effects to be of economic significance.

Twenty worm-free lambs were given a mixed infestation of worm larvae and 20 similar lambs maintained as controls. After 147 days all the lambs were slaughtered, the experimental lambs being found to carry an average of 2,000 worms whilst the control group remained worm-free.

The infested lambs were inferior in the following respects :– scouring was noted in 13 of them but in only one of the controls ; at the end of the experiment none of them was judged fat whereas eight of the controls were fat ; their live-weight increase, dead weight, and the haemoglobin percentage of their blood were significantly lower than those of the controls.—K. M. SANDERSON.

TALIAFERRO, W. H., & SARLES, M. P. (1939). **The Cellular Reactions in the Skin, Lungs and Intestine of Normal and Immune Rats after Infection with Nippostrongylus muris.**—*J. infect. Dis.* **64.** 157–192. 16 plates. [Num. refs.]

Rats free from *Bartonella* infection were artificially infected with *N. muris* by placing a suspension of freshly isolated infective larvae on the clipped and moistened abdominal skin. Various tissues were taken from the animals under anaesthesia at intervals varying from half-an-hour to 16 days. Other groups of rats were exposed to infection after having been rendered immune by previous infestation. Histological studies were made to determine whether the reaction to the parasite varied with

the degree of immunity. The authors claim that immunity to the parasite is primarily humoral with a more or less secondary cellular co-operation. In immune rats the antibody was able to retard the development and migration of the worms; in some cases the parasites were destroyed, in which case macrophages and giant cells removed the debris. A special effect of the antibody is stated to be the formation of precipitates in and around the worms; it is suggested that these precipitates may cause retardation of development by interfering with ingestion and digestion of food.

In immune animals, mobilization of macrophages is more rapid in the skin, lungs, and lamina propria of the intestine. Eosinophiles and plasma cells appear late in initially infected animals, and early and in large numbers in immune animals. It is stated that macrophages can arise directly by transformation of lymphocytes as well as by the accepted paths from blood monocytes, tissue histiocytes, and other cells of the reticulo-endothelial system. Immunity is first developed in the intestine and is only found in the lungs and skin after repeated infestations. The basis of the immunity is considered to be the same in all three sites. These views, which differ from those of some other workers, are discussed in detail.—E. G.W.

SAWITZ, W. (1938). **Prevalence of Trichinosis in the United States.**—*Publ. Hlth Rep., Wash.* **53.** 365–383. 6 figs., 4 tables. [Numerous refs.] [Author's summary copied *verbatim*].

1. The number of clinical cases of trichinosis reported to the United States Public Health Service for the years 1915–36 is 2,968. This figure, together with 1,575 cases compiled by Ransom for the years 1842–1914, indicates that 4,543 cases of trichinosis have been diagnosed and recorded in the United States during 94 elapsed years.

2. Statistically, the yearly incidence of trichinosis has considerably increased in recent years. Since the annual morbidity rate of trichinosis cases for the population for which it was reportable shows a parallel increase, the numerical increase cannot be explained solely by the expansion of the reporting area. Although no new diagnostic method was used during the time concerned, the stimulated interest in the disease might have played a part in the increase in reported cases.

3. The mortality rate for trichinosis cases has decreased from 15·4 percent for 1842–1914 to 4·4 percent for 1926–36, indicating that more mild cases are now diagnosed and reported than formerly. These cases were either formerly overlooked or occur now more frequently. Assuming the latter, an explanation for it could be derived from the fact that nowadays pork products are usually made up from several hogs, and thus a *Trichinella*-infected hog has the chance of infecting more people than formerly, while at the same time the infection is less severe.

4. There is a definite seasonal fluctuation in the occurrence of trichinosis, with the peak in winter and a decline in summer. The explanation that pork consumption is higher in winter than in summer is supported by monthly figures on slaughtered hogs.

5. The geographic distribution of the trichinosis cases shows the highest incidence in the eastern and western parts of the United States.

6. To supplement the trichinosis reports of the United States Public Health Service, a compilation of all cases of trichinosis published in medical journals has been made. The total number of all clinical cases of trichinosis recorded in the United States since 1842 amounts to between 5,000 and 6,000.

7. In post-mortem examinations by various authors and in various parts of the United States, 410 *Trichinella*-infected cases were found out of 3,322 cases examined, an incidence of 12·34 percent. This average percentage, applied to the living population of the United States, would mean that 16,000,000 people in this country are infected with *Trichinella spiralis*.

IMMUNITY

BROWNLEE, A. (1940). **Allergy in the Domestic Animals.**—*J. comp. Path.* **53.** 55–74. [Numerous refs.]

In an attempt to throw light on the nature of many obscure diseases of domestic animals, B. reviews the evidence in favour of the theory that they are, partly at least, allergic states due to the presence of foreign protein, whether ingested or otherwise taken in.

In the introduction some research into experimental sensitization and anaphylaxis is reviewed and general comments are made on the handling

and feeding of such animals as are subject to diseases of the types under discussion, with the object of pointing out physiological disturbances so induced; for instance, certain diseases are associated with rich and abundant food. Diseases discussed are :– milk fever, lactation tetany, canine hysteria, fowl paralysis, scrapie in sheep, shivering and stringhalt in horses, certain anaerobic infections in sheep, lymphangitis, laminitis and purpura in horses, photosensitization, angio-neurotic oedema in pigs and dogs, eczema in dogs, potato dermatitis in cows, grease in horses, and certain cases of drug allergy in animals. B. also includes an anaphylactic condition in cattle caused by the destruction of ox warble larvae in their backs, which he names "*Rosenfeber*", although this term is not in common use by writers on the phenomenon.—J. E.

—. (1939). **Report of the Special Committee on Tuberculin Tests. [Nat. Vet. Med. Ass. Gt. Brit.]**—*Vet. Rec.* **51.** 559–565.

This Committee was appointed in October 1938 to investigate the various tuberculin tests used for animals in Great Britain. During the first year it has confined itself to the double intradermal test for cattle. The report is divided into eleven sections, of which those on types of tuberculin, standardization and potency, and the identification of tested cattle, are most fully dealt with. Resolutions were passed to the effect that synthetic medium tuberculin is superior to old tuberculin, and that an international standard for tuberculin for use on cattle is urgently necessary.

It is stated that there is at present no scientific data from which a particular potency of tuberculin can be agreed upon as suitable for use in standardization. Special research is urged.

A procedure for the marking of cattle was agreed to.

GLOVER prepared an account of the preparation of old tuberculin and synthetic medium tuberculin and on the standardization and potency of tuberculin; this is appended to the report.—J. E.

HAAG, F. E. (1939). Tierexperimentelle serodiagnostische Untersuchungen bei Tuberkulose. **[Experiments on the Serological Diagnosis of Tuberculosis].** —*Z. ImmunForsch.* **96.** 109–117. 1 table. [6 refs.]

H. concludes from experiments on a small number of g. pigs and rabbits that the flocculation reactions known in Germany as the *Meinicksche Tuberkulose* reaction and the *Tuberkulose-Ballungsreaktion* are of value in the diagnosis of TB. in g. pigs and rabbits, but that, as in human beings, the reactivity of the blood serum varies from time to time making several examinations necessary. The inoculation of bacilli of low virulence also gives rise to reactions, but the inoculation of dead bacilli gives rise to slight reactions at most. [It appears from the data given that the value of the test is interfered with seriously by the high proportion of weak or negative reactions in animals infected with virulent organisms.]

—A. W. STABLEFORTH.

MENEFEE, E. E., Jr., & POSTON, Mary A. (1939). **Significance of Standard Laboratory Procedures in the Diagnosis of Brucellosis.**—*Amer. J. med. Sci.* **197.** 646–653. 6 tables. [15 refs.] [Authors' summary copied *verbatim*].

1. There appears to be a direct relation between raw milk consumption and skin reaction to brucellergin.
2. Skin tests are not without danger, since severe local and systemic reactions are not infrequent.
3. There appears to be little correlation between skin reactivity and measurable antibody content of the serum.
4. Endermic infection of brucellergin will cause a definite increase of circulating antibodies in allergic patients.
5. Brucellergin followed by typhoid vaccine will cause a greater and more prolonged increase of circulating antibodies than brucellergin alone.
6. Any febrile reaction will cause an increase of circulating antibodies.
7. In survey work, a better immunologic picture is obtained by measuring the antibodies at the height of the antibody response to brucellergin.
8. Negative skin tests, agglutinins and opsonocytophagic reactions do not rule out the possibility of Brucella infection.
9. Positive skin tests, low agglutinins and a moderate opsonocytophagic reaction, even when accompanied by suggestive signs and symptoms, do not prove the diagnosis of brucellosis.

ROEPKE, M. H., & MURDOCK, W. D. (1940). **The Effect of Variations in Technic on the Rapid or Plate Agglutination Test**

for Bang's Disease.—*Cornell Vet.* **30.** 449–464. 9 tables.

The authors have studied certain factors which affect the accuracy of the plate method of agglutination testing for brucella infection. Whilst commenting that the use of test suspension of uniform sensitivity has contributed greatly towards uniform results, they consider that a more rigid standardization of methods is desirable in order to reduce the discrepancies which still occur between the results of different workers—chiefly with sera of intermediate titre, some 5% of samples. Forty-five sera were tested repeatedly in various ways.

It is concluded that the position of the serum on the plate is of minor importance (the time interval between mixing suspension and serum and reading may vary appreciably if 6–10 sera are tested in line at once). There is about an even chance of getting exactly the same result at two successive tests of the same serum ; most of the remainder differ by half a dilution, some 5–10% by one tube. Averages were, therefore, taken in studying other factors. Sufficient stirring, 4–6 sec., to give a thoroughly homogenous mixture, was found necessary if constant results were to be obtained. Standardization of the spot size or area covered by the serum-suspension mixture is another factor of importance, a diameter of about 34 mm. being apparently favoured for the nominal 1 : 25 dilution (0·03 suspension and 0·08 serum), decreasing to 17 mm. for the nominal 1 : 400 dilution (0·03 suspension and 0·005 serum). This gradual reduction of spot size for the higher dilutions in which less serum is used, so as to keep the depth of fluid approximately the same is considered desirable. The factor apparently of the greatest importance is the time of reading and rotation of the plate. Lengthening of the interval between mixing and reading from 8 to 15 or 30 min. increases the titre some 10%, but if the mixture is rotated at 8 min. and re-read at 12 min., rotated again and re-read at 15 min. or later, the increases in titre are 30% or more. Preference is given to a 10 min. reading after rotating at 5 min. The latter observations were made in quadruplicate.—A. W. Stableforth.

Mello, A., & Rogick, F. A. (1939). Brucelose e sôro-aglutinação. [**Brucella and Sero - Agglutination**]. —*Rev. industr. Anim.* **2.** No. 1. 142–157. 4 tables, 2 graphs. [Numerous refs.] [English and French summaries].

Using 542 blood samples which had reacted negatively at titres of 1 : 50 and 1 : 100, the authors retested them with a compound *abortus-suis-melitensis* antigen at serum dilutions of 1 : 2·5, 1 : 3·5, 1 : 5, and 1 : 10 and obtained positive reactions with all but 29 sera at all titres except 1 : 10. They seem to regard these results as evidence of infection, though no attempt to verify this was made. They draw attention to the variation in technique of different workers and state the need for standardization.—Miller Watson.

Catz, J. (1939). Inactivation de la toxine du *Bacillus oedematiens* par l'acide ascorbique (vitamine C). [**Inactivation of the Toxin of** *Clostridium oedematiens* **by Ascorbic Acid**].—*C. R. Soc. Biol. Paris.* **131.** 618–620. [7 refs.]

Mixtures of 0·1 c.c. of 5% ascorbic acid and 1 c.c. of a 1–10 dilution of *Cl. oedematiens* toxin, 0·2 c.c. of ascorbic acid and 1 c.c. of a 1 : 100 dilution of toxin, and 1 c.c. of a 1 : 500 dilution of toxin, were adjusted to pH 7, kept at 37°C. for 24 hours and injected in 1 c.c. doses into three groups of 3 g. pigs. Three groups of 3 control g. pigs were injected with corresponding dilutions of toxin alone. Results showed that the 1 : 100 and 1 : 500 dilutions of toxin were completely inactivated. After removal of 68% of the ascorbic acid by dialysis from the mixture containing a 1 : 100 dilution of toxin, the toxin remained attenuated.—R. O. Muir.

Schultz, M. P., & Rose, Edythe J. (1939). **The Antigenic and Synergistic Action of a Toxic Serum Extract of Hemolytic Streptococci.**—*Publ. Hlth Rep., Wash.* **54.** 596–607. 5 figs. [8 refs.] [Authors' conclusions copied *verbatim*].

1. Following the intravenous or intracutaneous injection into rabbits of a toxic rabbit serum extract of hemolytic streptococci, humoral antibodies were not demonstrable and the cutaneous reactivity of the animals to test doses of the homologous culture was not altered.

2. The cutaneous reactivity of rabbits to normal, pooled rabbit serum was enhanced by repeated intracutaneous injections of such serum, by the induction of bacterial hypersensitivity and by the repeated intracutaneous injection of toxic rabbit serum extract of hemolytic streptococci. The latter treatment induced the highest degree of hypersensitivity to normal, pooled rabbit serum.

3. The cutaneous reactivity of rabbits to toxic rabbit serum extract of hemolytic strepto-

cocci was depressed by preliminary intravenous immunization with the homologous strain and by repeated intravenous injections of such toxic extract. On the other hand, a high degree of cutaneous hypersensitivity to this toxic extract developed following preliminary intracutaneous injections of the substance.

4. Alterations in cutaneous reactivity induced by treatment with toxic serum extract were apparently independent of humoral antibody development.

LAMONT, A., FIROR, W. M., & SHUMACKER, H. B., Jr. (1940). **The "Lethal Dose" of Toxin in Experimental Tetanus.**—*Johns Hopk. Hosp. Bull.* **67.** 25–40. 6 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

1. Unless the dose of toxin is exactly defined and accurately determined, valid conclusions cannot be drawn from experimental work with impure substances such as tetanus toxin, nor can the results obtained by different workers be compared.

2. Various precautions are described which must be observed if consistent results are to be obtained.

3. Observations are recorded concerning the effect of varying the route of administration of the toxin.

4. The relative susceptibility of different species to tetanus toxin is discussed.

SHUMACKER, H. B., Jr., FIROR, W. M., & LAMONT, A. (1940). **Toxin-Antitoxin Reactions in Experimental Tetanus.**—*Johns Hopk. Hosp. Bull.* **67.** 92–106. 7 tables. [11 refs.] [Authors' summary copied *verbatim*].

1. When tetanus antitoxin is injected intravenously into guinea-pigs, mice, dogs, and cats a given amount of antitoxin does not neutralize the same number of guinea-pig median lethal doses of toxin in each species. The number of G-P LD 50's that are neutralized is least in the very sensitive guinea-pig, greater in the slightly less sensitive mouse, and still greater in the resistant dog and cat. This difference cannot be explained either by the difference in the lethal dosage for each species or by a difference in concentration of antitoxin.

2. Regardless of the species used, there are differences in the protecting power of intravenously injected antitoxin against toxin subsequently introduced by various routes. Antitoxin is only very slightly effectual against toxin placed in the spinal cord; is very much more effectual against toxin given intradermally, intramuscularly, or subcutaneously; and is still more effectual against toxin injected intravenously. Antitoxin is most effectual when mixed *in vitro* with the toxin and then injected into the animal.

3. The experimental results are discussed in relation to certain theories proposed in the literature.

WEIL, A. J., PARFENTJEV, I. A., & BOWMAN, K. L. (1938). **Antigenic Qualities of Antitoxins.**—*J. Immunol.* **35.** 399–413. 2 figs. on 1 plate, 4 tables. [18 refs.]

A comparison is given of the antigenic properties of antitoxic globulin prepared by a process of partial peptic digestion, with that of normal and of immune horse sera, as well as of antitoxic globulin that was salted out in the usual way with ammonium sulphate. In most of the experiments diphtheria antitoxin was employed; the reactions of rabbits, g. pigs, and human beings were tested. The results show that the antigenic qualities of antisera modified by partial peptic digestion are very considerably impaired. Rabbits injected with such material respond, if at all, with slight and delayed formation of antibody. The same is true for the development of cutaneous hypersensitiveness of rabbits and g. pigs; the activity of the modified globulin in the skin of actively or passively sensitized human beings is about 1/500th that of the unaltered globulin. The modification by the process of digestion is not complete because prolonged immunization of rabbits with the modified antitoxic globulin may finally induce some antibody formation and even development of a moderate degree of cutaneous hypersensitiveness. It was also shown that enough unmodified globulin remains in these preparations to sensitize g. pigs to normal globulin, but not to the peptic digest. These facts demonstrate that antibody introduced in the form of pepsin-digested solutions are less likely to induce reactions of supersensitiveness.

It is shown that the antibody itself is present in a modified form in the digested solutions. Previous observations that antitoxins in unmodified form have the same antigenic qualities as the protein of the species from which they are derived, are confirmed.—R. ALLCROFT.

HALLWACHS, H. (1938). Blutgruppenuntersuchungen und Bluttransfusionen beim

Pferde. [**Blood Groups and Blood Transfusion in Horses**].—*Inaug. Diss., Berlin.* pp. 40. 1 fig., 12 tables. [Numerous refs.]

H. determined the blood groups of 400 light army horses. He found evidence of the existence of six agglutinogens (A-F) and six corresponding agglutinins (α–ϕ). The 64 combinations in which they occurred are given in tables which should be studied. Nearly half of all the blood samples contained two agglutinogens, AB being the commonest combination. The agglutinins were less abundantly found, 67% of all samples having none. Landsteiner's rule, that blood not containing the agglutinogens A and B always contains the agglutinins α and β, was confirmed.

Experimental transfusions were carried out on 12 horses, the blood groups of donor and recipient being known beforehand in only two cases. Results were good as regards lack of shock in the recipients in ten cases, but bad in two cases. In the latter it was later determined that the recipient's blood contained α agglutinin and the donor's blood A agglutinogen. Symptoms of shock due to agglutination and lysis of transfused red blood corpuscles included slight rise in temperature, marked rise in pulse and respiration rates, icterus, sweating, and greater or lesser excitement.

The determination of blood groups in horses requires laboratory facilities and supplies of known types of r.b.c. and serum; in active army conditions, therefore, it is impossible to determine blood groups before transfusion. The most rapid practical test of compatibility is the small dose test, wherein the transfusion is begun with 100–200 c.c. and continued or stopped as the recipient's behaviour indicates.

H. states that it is desirable that a record should be made of the individual blood group of every army horse, so that the choice of donor animal can be quickly made when transfusion is indicated.—J. E.

MOLOMUT, N. (1939). **The Effect of Hypophysectomy on Immunity and Hypersensitivity in Rats with a Brief Description of the Operative Technic.**—*J. Immunol.* **37.** 113–131. 4 figs., 3 tables. [Numerous refs.]

Complete ablation of the hypophysis did not affect antibody production in rats to any significant degree when sheep red blood cells, crystalline egg white, and horse serum were used as antigens, but it did render them susceptible to active anaphylactic shock. The longer the time interval between removal of the gland and the actual shock injection, the greater was the susceptibility to the shock.

The operative technique for the removal of the hypophysis in rats and g. pigs is described.
—R. ALLCROFT.

DISEASES, GENERAL

DALLING, T. (1940). **Diseases of Animals—Prevention and Treatment.**—*J. R. agric. Soc.* **101.** Part I. 34–48. [Num. refs.]

The following diseases are dealt with in a contribution to "The Farmer's Guide to Agricultural Research during 1939":– sway-back, joint-ill and pyaemia in lambs; mastitis in sheep; contagious abortion, trichomoniasis, mastitis and tuberculosis in cattle, and fowl paralysis.—ALASTAIR N. WORDEN.

CARPANO, M. (1938). Nuove ricerche sulle malattie tropicali e subtropicali. [**Recent Researches on Tropical and Subtropical Diseases**].—*Rep. 13th int. vet. Congr. 1938.* **2.** 765–773. [6 refs.] [In Italian: English, French and German summaries. Discussion pp. 808–809 in English and French].

Necrotic dermatitis in ruminants was found to be due to an organism identical with *Corynebacterium diphtheriae*, and the extent to which infected animals may constitute a source of diphtheria infection in human beings is discussed.

An infection manifesting itself as ulcerative lymphangitis in equines, as necrotic dermatitis and pyelonephritis in bovines, and as caseous adenitis in ovines is described. It also occurs in camels when it may occur in either of the above forms.

Mycobacterium tuberculosis not identical either with the human or bovine type was isolated from two cases of TB. in bears from Ceylon.

There is discussion on the location of *Trypanosoma theileri* in the tissues of the host.

It is suggested that the pathogenic flagellates be classed according to their site of predilection into four groups, of which *T. evansi*, *T. gambiense*, *T. cruzi*, and *Leishmania infantum* are quoted as prototypes.—E. MARTIN.

INNES, J. R. M., & WHITTICK, J. W. (1940). **Thrombo-Angiitis Obliterans in a Horse.** —*J. Path. Bact.* **50.** 377–381. 1 text fig., 6 figs. on 1 plate. [7 refs.]

The case described appears to be the first record of the occurrence in an animal of arterial disease analogous to that described in man as thrombo-angiitis obliterans. The subject was a nine-year-old thoroughbred mare which, raced until she was four, had not been used again for work of any kind. She had never shown any signs of lameness and was destroyed while undergoing experiment. P.M. examination revealed (amongst other findings) thrombosis of the termination of the abdominal aorta and occlusion of the large arteries of both hind limbs by thrombosis. The absence of other possible aetiological factors led to the conclusion that the condition was one of primary arterial disease. The macroscopic and microscopic changes are described in detail, the latter being well illustrated by photographs.

—J. R. LAWSON.

FRIEDRICH. (1939). Zur Frage der Sennekrankheit. **[Senne Disease of Horses].** —*Tierärztl. Mitt.* **20.** 337–340.

The value of this article lies in the detailed description of the symptoms of a condition somewhat resembling grass sickness or Borna disease which occurs as an epizootic at certain periods of the year among horses kept at or around Senne, and in an account of the appearance of animals which have died from it. The history of the disease, which first appeared in troop horses in camp at Senne in 1911, is given.

The cause of the condition is not known, but it has been most often ascribed to the consumption of mouldy forage. F. criticizes this assertion along with others and shows why none of the suggested theories as to causation is satisfactory.—G. WILLIAMSON.

LÜBKE, A. (1939). Die Diagnostik der Rinderleukose durch histologische Lymphknotenuntersuchung. Zugleich ein Beitrag zur Histologie der Lymphknotenveränderungen. **[Diagnosis of Bovine Leucosis by Histological Examination of the Lymph Nodes].**—*Arch. wiss. prakt. Tierheilk.* **74.** 325–347. 14 figs. [4 refs.]

L. has made a detailed histological study of the changes occurring in the subcutaneous lymph nodes of cattle with bovine leucosis, of bovines without macroscopic lymph node lesions but with a suspicious blood picture, and of normal cattle free from the disease. He has also carried out histological studies on biopsy material obtained by the removal of superficial lymph nodes from normal and affected cattle.

The earliest stages in the disease consist of the appearance of modified reticulo-endothelial cells derived from reticulum and sinus endothelial cells which L. describes for convenience as " leucosis cells ". These cells proliferate in the lymph sinuses and invade secondarily the lymph follicles, the central parts of which are later converted into leucotic tissue. At a later stage the normal architecture of the lymph node is almost completely obliterated and the tissue consists of a richly cellular, partly syncytial mass with a variable amount of newly formed reticulum fibres. L. considers bovine leucosis to be a generalized neoplastic condition resulting from proliferation of reticulo-endothelial cells and classes the disease within the group " reticulo-endotheliosis ".

The examination of biopsy material by histological methods was found valuable for the detection of subclinical cases among animals with a blood picture which is suspicious of leucosis.—E. G. WHITE.

FRAUCHIGER, E., & HOFMANN, W. (1940). Der erste Fall einer Pachymeningitis cervicalis hypertrophica beim Rind. **[The First Case of Hypertrophic Cervical Pachymeningitis in the Ox].**—*Schweiz. Arch. Tierheilk.* **82.** 1–6. 3 figs.

This condition is well known in human pathology and there is a single record of a case in a horse. The present case occurred in a five-week-old bull calf which suddenly developed paralysis of all four legs, some degree of opisthotonus, and diminished sensitivity to skin stimulation. Some improvement followed and the animal was successfully reared to the age of one year when the owner decided on slaughter. The steer was then in fair bodily condition, the gait was unsteady and suggested cerebellar ataxia, and skin sensitivity was considerably diminished.

At autopsy the cervical dura mater was grossly thickened (up to 15 mm.) and this thickening extended anteriorly over the cerebellum, in which structure a mass of thickened dura was embedded. The central nervous system showed no other abnormality. Histological examination showed chronic inflammatory changes in the thickened dura extending into the cerebellar tissue. No bacteria were

observed in sections, although there were focal areas of necrosis surrounded by neutrophile leucocytes. The aetiology of the condition could not be determined.—E. G. WHITE.

WETZEL, J. O., & MOORE, L. A. (1940). **Blindness in Cattle due to Papilledema. With Autopsy Report on Six Cases.**—*Amer. J. Ophthal.* **23.** 499–513. 9 figs. 2 tables. [16 refs.]

A detailed review is given of cases of blindness in young bovines which have been recorded in Great Britain and in America. Affected animals may be born blind or may suddenly become blind at any time during the first year of life. Attention is directed to recent studies on the relation of dietary deficiency to blindness in calves [see also *V.B.* **11.** 123].

The authors carried out ophthalmoscopic observations on six calves which became totally blind on an experimental diet, and also made a detailed macroscopic and histological study of the eyes and orbit P.M. The ration fed was skim milk, " Rice Krispies ", yeast, " viosterol ", carotene, minerals, and milk of magnesia. The six calves were put on the experimental diet when 26–31 days old. Blindness was first noticed in five of the calves between the 266th and 289th day; the sixth calf became blind only after 487 days. Papilloedema of 2–4 dioptres was the most significant ophthalmoscopic finding, and occurred in all the animals. Some of the affected calves showed during life an unsteady gait and epileptiform convulsions. At autopsy there was gross constriction of the bony optic canal and narrowing of the optic nerve; the latter appeared to be the direct result of the narrowing of the bony canal.

The possibility that the condition is due to vitamin A deficiency is discussed and it is pointed out that the amount of carotene given to the calves was probably below the minimal requirement. Addition of carotene in large amounts to a calf in which blindness had developed in one eye prevented the animal from becoming blind in the other. Addition of carotene also rapidly cured night blindness but was relatively ineffective in curing papilloedema. The former condition is due to interference with the regeneration of the visual purple, whereas the latter results from increased intracranial pressure and precedes total blindness resulting from constriction of the optic canal. It is suggested that narrowing of this bony canal is caused by a rise in intracranial pressure occurring in calves during the growing period; a similar rise in pressure after completion of growth would be without effect on the optic canal and this accounts for the absence of blindness from constriction of the optic canal in adult cattle.—E. G. WHITE.

DERIVAUX, J. (1939). La contracture des muscles jambiers postérieurs chez les veaux et les jeunes bovidés. [**Contracture of the Posterior Limb Muscles of Calves and Young Cattle**].—*Ann. Méd. vét.* **84.** 401–407. 3 figs.

This condition occurs as a tonic contraction of the gastrocnemius muscles of one or both hind limbs resulting in contracture. It has been previously described in Germany and Belgium and is usually first noticed when affected calves are 3–4 months old, although it is in fact present from the time of birth. The affected muscle and tendon are in a state of tonic contraction when the animal is standing, but partial relaxation occurs when it is recumbent. The point of the hock of the affected limb is raised, there is some muscular atrophy, and the animal usually walks on three legs. Various theories have been advanced as to the aetiology of the condition, including interstitial neuritis, degenerative changes in the postero-lateral columns of the spinal cord, and rickets. It has been stated that the condition is inherited.

Although the contraction is easily overcome by mechanical means, and tends to diminish when the animal is recumbent, spontaneous improvement does not occur.

D. has successfully carried out an operation recommended by GÖTZE which consists of cutting the tendons of the gastrocnemius muscle and the superficial part of the flexor tendon under local or epidural anaesthesia. The animal's gait is at once improved and it becomes normal after about three months.

—E. G. WHITE.

INNES, J. R. M., RUSSELL, Dorothy S., & WILSDON, A. J. (1940). **Familial Cerebellar Hypoplasia and Degeneration in Hereford Calves.**—*J. Path. Bact.* **50.** 455–461. 10 figs. on 4 plates. [13 refs.]

A condition of familial cerebellar hypoplasia which appears to affect calves of the Hereford breed only is described. Material was examined from five affected pure-bred Hereford calves, which came from three different and widely separated farms. Pathological changes

were confined to the cerebellum which was abnormally small, all the folia showing some degree of wasting. Macroscopically, the molecular and granular layers were both abnormally thin and characteristic features were an excess of neuroblasts in the molecular layer and an almost complete absence of Purkinje cells. Those Purkinje cells which were seen were usually shrunken and deformed, their dentrites being few, coarse, and angular. The microscopic changes and the clinical symptoms (those of ataxia) are described in detail and are excellently illustrated with photographs. Similar and analogous conditions noted in other species of animals, and in man, are discussed and comparisons made. It appears that the condition is hereditary and possibly owes its occurrence in Hereford cattle to intensive inbreeding.—J. R. LAWSON.

I. INNES, J. R. M. (1939). **Swayback : A Demyelinating Disease of Lambs with Affinities to Schilder's Encephalitis and its Prevention by Copper.**—*J. Neurol. Psychiat.* **2.** 323–334. 10 figs., 1 table. [5 refs.]

II. SHEARER, G. D., INNES, J. R. M., & MCDOUGALL, E. I. (1940). **Swayback Studies in North Derbyshire. II. The Relationship of the Storage of Copper and Lead in Body Tissues to the Causation of Swayback.**—*Vet. J.* **96.** 309–322. 4 tables. [18 refs.] [For part I, see *V. B.* **10.** 612].

I. This comprises an extensive summary, in more or less chronological order, of the work carried out on the pathology of "swayback" and its prevention by Cu supplements. All the papers discussed have been adequately covered in *V. B.* **6.** 607; **7.** 132, and **10.** 612. [See also DUNLOP & WELLS, *V. B.* **9.** 492, for the first indication of the efficacy of Cu therapy in swayback in this country.]

II. Continuing their investigations on "swayback" in lambs in Derbyshire, the authors confirm their previous findings of low levels of Cu in the blood and liver of lambs affected with the disease. There did not appear to be any direct relationship between the blood Cu level of the ewe and the development of "swayback" in the offspring, although from the results of feeding Cu supplements to the ewes at varying periods before lambing, it appeared that the foetal demands for Cu must be satisfied about halfway through the gestation period. There was a definite rise in blood Cu of ewes with advancing pregnancy, being most pronounced in those ewes receiving 1 % Cu in licks throughout gestation.

In view of the suggested association of Pb with certain demyelination disorders and of earlier views on enzootic ataxia [*V. B.* **6.** 257.], chemical determinations of Pb were made in the pastures of the area and in tissues of affected sheep. Although the Pb intake of ewes in the Derbyshire area was much higher than in normal areas and this difference was reflected in increased storage in the tissues, no significant differences were found in the Pb contents of the tissues between affected and unaffected lambs or adults, and Pb appeared to play no major part in the aetiology of the disease. Adequate Cu appeared to be available in the pastures, but some factor appeared to interfere with its proper assimilation, although this was not reflected by any significant lowering of the Cu of the liver or in the blood. It is emphasized that while Cu is an effective prophylactic agent, "swayback" is not due to a Cu deficiency of the pregnant ewe *per se.*

—ALFRED EDEN.

I. —. (1940). **Toxaemic Jaundice in Sheep — Further Investigations.** — *J. Coun. sci. industr. Res. Aust.* **13.** 58–59.

II. GRAYSON, A. R. (1940). **Toxaemic Jaundice of Sheep.**—*J. Dep. Agric. Vict.* **28.** 349–350.

I. This disease has been responsible for considerable annual loss of sheep in Australia in recent years, the losses being almost entirely confined to British breeds and their crosses; it is limited to fairly well-defined areas of New South Wales and Victoria. The cause of the condition is not definitely known, but bacteriological investigations have failed to attach the responsibility to bacterial organisms and there is no evidence that toxic plants may be the cause, although it is thought that an unusually high Cu content of the pastures may be responsible. The disease has not been definitely associated with any particular seasonal conditions, although the heaviest losses have occurred in the spring and autumn. The symptoms shown by affected animals are those of general malaise with a staggering gait, pallid or yellow mucosae, skin pale and distinctly yellow in colour, and dark, reddish brown urine. It may occur in the hyperacute form in which the sheep are visibly ill for only a few hours, or in the subacute form in which the symptoms are manifest for 2–4 days; the per-

centage of recoveries is small. P.M. examination shows a yellow and very friable liver, black and enlarged kidneys, and nearly all body tissues yellow.

Data from recent investigations suggest that the disease is characterized by an abnormally high copper storage in the liver and a sudden rise of Cu in the blood leading to destruction of red blood cells and consequent kidney damage.

II. The occurrence and symptoms of toxaemic jaundice of sheep are described [see I]. It usually occurs in sheep and more often in ewes, 3–4 years old. The general result of investigations to date confirms the hypothesis that the disease is associated with a disturbance of Cu metabolism. Analyses of blood taken from sheep in field experiments show that a sudden increase in blood Cu, which may be of short duration, precedes and causes the onset of jaundice which is accompanied by haemoglobinuria. In those animals which recovered or lived for some time after the onset of jaundice, the urine remained neutral or slightly alkaline, but death invariably occurred when the urine was acid. No analytical data are given.—R. ALLCROFT.

CORNER, H. H., & SMITH, A. M. (1940). **Cobalt and Pine Disease. [Correspondence].**—*Vet. Rec.* **52.** 596. [2 refs.]

The curative value of cobalt in "pine disease" of sheep on the Scottish side of the border is reaffirmed, as against the failure of STEWART and PONSFORD [*V. B.* **10.** 856.] to obtain similar curative results on a farm on the English side. Further successful cobalt therapy is mentioned in trials on over 300 sheep on 22 different farms, with a recovery rate of 98%. It is suggested that the negative results and association with helminth infection in the English case may have arisen from undue concentration of sheep on the pining farm in question.

[The shepherd's term "pine" is a loose one and aetiology may vary from farm to farm. Further evidence from other parts of England, and notably the work of ROWLANDS in North Wales, indicates that trace element deficiency, probably most commonly of cobalt, is one factor and may be dominant, but that in other cases response to anthelmintic treatment with phenothiazine succeeds when cobalt administration fails. On some farms either treatment is apparently effective and combined treatment probably best. The view of STEWART and PONSFORD has long been that "Northumbrian pine" is due to a combination or "interaction" of parasitic infestation and malnutrition, either specific or general.]—H. H. GREEN.

—. (1939). **Report of the Committee on Transmissible Diseases of Swine.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass. 1938.* pp. 99–100.

Replies to circular letters addressed to veterinarians in different parts of the U.S.A. indicated that swine fever continued to be the most important communicable disease of pigs during 1938, although severe epizootics were not reported. Next in order of importance was "the enteric syndrome", a name given to various forms of enteritis including that ascribed to *Salmonella suipestifer* infection. Parasitic infestation and pulmonary infections were sources of serious losses, while the occurrence and clinical manifestations of swine erysipelas were variable.

Measures which are strongly recommended include routine vaccination against swine fever, a vigorous educational campaign on the part of state and federal officials, and regulation of auction sales and of the movements of swine within a state.—ALASTAIR N. WORDEN.

KOEN, J. S. (1940). **Discussion of Swine Enteritis.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass. 1939.* pp. 243–245.

During 1939 K. encountered many cases of "enteritis" during his work for the hog cholera section of the Bureau of Animal Industry. It appears that losses from this disease in Western Iowa were heavier than from those due to swine fever. A colitis, accompanied by a bloody discharge from the caecum, colon and rectum, or a gastro-colitis, were the commonest forms; in a few herds only were lesions of the small intestines discovered. The disease attacked animals vaccinated against swine fever as readily as it did non-vaccinated stock, and did not discriminate between large and small herds, or between herds maintained under filthy conditions and those on clean ground. Nevertheless, the condition did not occur in the largest herd in Iowa, where a modified McLean County system of swine sanitation is employed, or in another large herd in which the pigs were farrowed indoors and never permitted to be off concrete until they had reached bacon weight. Treatment of affected animals was disappointing, and all laboratory attempts to discover a specific cause were unsuccessful.—ALASTAIR N. WORDEN.

WILSON, F. M. (1940). **Enteritis in Swine.**—*J. Amer. vet. med. Ass.* **96.** 141–145. [1 ref.]

A review by a practitioner, in which the following types of enteritis are discussed: (1) white scours of unweaned pigs due to infection with organisms of the colon-typhoid group; (2) "true necrotic enteritis", due to a primary *Salmonella suipestifer* infection and to a constant secondary invasion by *Fusiformis necrophorus*; (3) "bloody scours" of fattening pigs, the etiology of which remains obscure; (4) a mild type due to coccidiosis; (5) that due to chemical irritants, and (6) secondary enteritis occurring in swine fever, swine erysipelas and anthrax.

In connection with (3), it is stated that a haemorrhagic enteritis is common in heavier fattening pigs which are placed in cattle yards. The condition is accompanied by an initial pyrexia, discoloration of the abdomen, and the passage of copious brick-coloured faeces; death is rapid. P.M. findings are enlargement of the spleen and lymph nodes, widespread congestion and petechial haemorrhages, gastritis, and a surface gangrene of, and oozing of blood from, the colonic mucosa. There are no constant bacterial findings. Attempts to transmit the disease by tissue filtrates are unsuccessful where immunity to swine fever remains.
—ALASTAIR N. WORDEN.

BLUNN, C. T., & HUGHES, E. H. (1938). **Hydrocephalus in Swine. A New Lethal Defect.**—*J. Hered.* **30.** 203–208. 3 figs., 2 tables. [6 refs.]

The occurrence of an external hydrocephalus, *i.e.* hydrocephalus in which the fluid accumulates in the subarachnoid spaces, was noted in piglets of an experimental herd of purebred Duroc-Jersey pigs. The condition was lethal, the piglets either being born dead or dying within two days of birth. All cases occurred in the progeny of a certain boar, or in that of his inbred son. Statistical examination of the frequency of occurrence showed quite clearly that the condition was due to a single recessive autosomal gene; males and females were equally affected.

There was considerable variation in the degree to which the condition was developed in individual piglets; in the most severe cases the sutures between the parietal and frontal bones were not fused, and an open fontanel was left. In every case, however, the condition was associated with an abnormally short tail (even an absence of tail) and with a light coat colour. Reduction of ear-size was noted in some cases.—ALASTAIR N. WORDEN.

PETERSEN, W. W. (1939). Svulster og Cyster i Navleregionen hos Svin. [**Umbilical Tumours and Cysts in Swine**].—*Skand. VetTidskr.* **29.** 661–691. 25 figs. [15 refs.] [English summary].

An illustrated account of 27 cases of umbilical growth, malformation, or cyst in slaughter pigs, such as P. has seen in 0·1% of about half a million pigs examined. Some were outside, some inside, and some on both sides of the abdominal wall. The structures seen are described and classified according to their form.—J. E.

FREEMAN, G. (1940). **Pathology of Spontaneous Pneumonitis and Hepatitis in Mice.**—*Arch. Path.* **29.** 505–510. 4 figs. [11 refs.]

There are several spontaneous infections in mice which are of importance in the differential diagnosis of experimental influenza virus infection in this species. All the infectious agents except the one causing "spontaneous pneumonitis and hepatitis" can be identified by the use of homologous antisera and immune test animals. F. describes in detail the pathology of this disease, with especial reference to its differentiation from the lesions in mice caused by the virus of influenza.

Mice were inoculated intranasally with material from the lungs of infected animals and were killed after 24 hours, 48 hours, and six days. Macroscopic lesions were confined to the lungs and were similar to those produced by the influenza virus. Histologically, the lesions were distinguished from those in the latter disease by the absence of metaplasia of the bronchial epithelium. Liver sections showed focal areas in which the liver cells were swollen and vacuolated; no such changes were found in the livers of mice infected with influenza virus.—E. G. WHITE.

I. DEOME, K. B. (1940). **Avian Lymphomatosis as a Neoplastic Disease.**—*Poult. Sci.* **19.** 83–90. [Num. refs.]

II. STUBBS, E. L. (1940). **Fowl Leukosis.**—*Ibid.* 90–91.

III. EMMEL, M. W. (1940). **Hemocytoblastosis in the Chicken.**—*Ibid.* 91.

IV. OLSON, C., Jr. (1940). **Discussion of Papers Entitled "Avian Lymphomatosis as a Neoplastic Disease" by K.B.**

DeOme; "Fowl Leukosis" by E. L. Stubbs; "Haemocytoblastosis in the Chicken" by M. W. Emmel.—*Ibid.* 92–93.

V. JUNGHERR, E. (1940). **Discussion of M. W. Emmel's Paper on "Haemocytoblastosis in the Chicken".**—*Ibid.* 93–94.

VI. JUNGHERR, E. (1940). **Wheat Germ Oil in the Control of Fowl Paralysis.**—*Ibid.* 94–99. [Numerous refs.]

VII. NORRIS, L. C. (1940). **Discussion of Paper Entitled "Wheat Germ Oil in the Control of Fowl Paralysis" by Erwin Jungherr.**—*Ibid.* 100–102. [14 refs.]

VIII. MARTIN, J. H. (1940). **Heredity and Avian Lymphomatosis.**—*Ibid.* 103–105. [15 refs.]

IX. DEOME, K. B. (1940). **Discussion of Paper by J. H. Martin Entitled "Heredity and Avian Lymphomatosis".**—*Ibid.* 105.

I. D. includes fowl paralysis [F.P.] among the neoplastic diseases and supports this theory by a number of observations. Referring to the three types of the disease, iritic, neural, and visceral, he states that all of them, representing different expressions of the same disease process, possess the neoplastic property of uncontrolled and unorganized growth; the growth may be invasive and may have the property of metastasis with a predilection for certain tissues. This theory of the neoplastic nature of F.P. is also supported by its aetiological similarities and relationships to the recognized avian tumours. The fact that selective breeding has produced strains of fowls with a high or low incidence of F.P. establishes an additional similarity to the neoplastic conditions found in animals for which a genetical interpretation of data has been made. F.P. lesions which begin as mild perivascular hyperplasia of cells of the lymphoid series are difficult to differentiate from the perivascular accumulations of lymphocytes usually seen in a certain percentage of apparently normal fowls.

II. The nature of the different strains of fowl leucosis is described briefly. Strain I, the causative agent of which has the properties of a virus, does not appear to have any relation to F.P. [see also *V. B.* **8.** 39, 510 and 511].

III. E. uses the term haemocytoblastosis for the condition characterized by an increase or decrease in leucocytes and the presence of immature and degenerative blood cells in the peripheral circulation; he considers that this may be induced by various causes which include salmonella infection. Further, it is stated that this condition may lead to the development in fowls of fowl paralysis and allied diseases [see *V. B.* **8.** 793].

IV. EMMEL's observation [see III] on haemocytoblastosis has not been recognized by other workers, as they have failed to confirm his view that F.P. and allied diseases may be produced by *Salmonella*.

After commenting on the existing knowledge of the aetiology of Rous chicken sarcoma No. 1 and other avian tumours, O. stresses the need for further work to determine the causes of these diseases and the factors which predispose to their development.

V. It is stated that EMMEL's use of the term "haemocytoblastosis" may lead to misunderstanding as it may be taken to mean a disease entity, but the term really denotes merely a myeloid response [see also *V. B.* **9.** 726]. It is suggested that this term should be replaced by more appropriate standard descriptive terms applied to the blood and blood-forming organs.

VI. Nutrition as a factor in the cause and prevention of F.P. was suggested by the work of BUTLER and WARREN [see *V. B.* **8.** 642.] who were successful in controlling fowl leucosis by the addition of wheat-germ oil to the rations, but these results have not been confirmed [see *V. B.* **10.** 128]. J. considers that no reason appears to exist for ascribing a specific anti-leucotic effect to wheat-germ oil, although an indirect relationship between E avitaminosis and leucosis cannot be ruled out. He therefore stresses that in order to clarify the position, accurate pathological description of diseases subjected to dietary treatment is essential. The resemblance of some of the symptoms of F.P. to those of nutritional encephalomalacia in chicks is discussed.

VII. While reviewing at length the value of incorporating wheat germ oil in poultry rations, N. considers that nutritional encephalomalacia of chicks is caused by the development of rancidity, as a result of storage, in the lard added to the ration and that this acts injuriously on the digestion.

VIII. M. cites instances where the inheritance of resistance and susceptibility to certain infectious diseases has been reported. Attention is drawn to the possibility of improving the

level of resistance in fowls to F.P. by selective breeding.

IX. D. remarked that for the control of F.P. in flocks, the only method available at present is by the genetical approach. It will be necessary to test whether or not a change of environment adversely affects inherited resistance of selected strains.—S. G. Iyer.

Marine, D., & Rosen, S. H. (1940). **Increase in the Incidence of Lymphomatosis in Male Fowls by Castration.**—*Amer. J. Cancer.* **39.** 315–318. 3 figs. [8 refs.] [Authors' summary copied *verbatim*].

Sixteen instances of lymphomatosis developed in a group of 119 S. C. [single combs] white Leghorns in which castration was attempted. Fifty-five of the 119 were sacrificed because of rapid comb growth. None of these showed active lymphomatosis but in two there was microscopic evidence of arrested lymphomatosis. Evidence is presented suggesting that the development of lymphomatosis was closely associated with the deficiency of male hormones, as manifested by the absence of comb growth in all 16 instances and the absence of testicular tissue in 11. In the remaining 5, atrophic fragments of testis were found. The manifestations of lymphomatosis here reported we believe represent the chronic and compensatory stage of the disease in contrast with the acute or paralytic stage.

Buer, A. W. (1939). Om multiple svulstdannelser hos husdyrene. [**Multiple Tumours in Domestic Animals**].—*Skand. VetTidskr.* **29.** 862–882. 10 figs. [Numerous refs.] [English summary].

B. defines four types of multiple tumour :– (1) tumours of the same kind in a single organ or organ system ; (2) tumours of the same kind in different organ systems ; (3) tumours of different kinds in various organ systems, and (4) mixed tumours in a single locus.

He describes two cases of multiple tumours in dogs. One dog had a mammary adenocarcinoma, cystadenoma of the mammae and of the ovaries, and a cavernous angioma on the neck, whilst the other had a mammary sarcomacarcinoma. These cases are described in detail and illustrated.—J. E.

—. (1938). **Fundamental Cancer Research. Report of a Committee Appointed by the Surgeon General.**—*Publ. Hlth Rep., Wash.* **53.** 2121–2130.

This committee, appointed by the Surgeon General, was formed to consider the fundamental aspects of the cancer problem and to suggest various lines of work which merit investigation. The report reviews briefly the present position of cancer research with regard to the biology of the cancer cell, carcinogenic agents, both chemical and virus, and hereditary factors, and suggests lines for future research. It lays particular stress on the importance of directing effort towards learning the mode of action of carcinogenic agents, and also of keeping the investigations in the general realm of agents which have a part in the naturally occurring disease, and not just extending the list which is already formidable. For the practical purpose of investigation, the cancer question is divided into two distinct objectives ; first, the causal genesis of tumours, including the inciting causes leading up to the development of malignancy, and, second, the formal genesis, or the factors responsible for the nature of the cancer cell and its tendency for unlimited multiplication. With regard to the formal genesis great importance is attached to the discovery of the nature of the cell capacity for unlimited or uncontrollable growth which is initiated by the carcinogenic agent, whether there is a break in the internal control mechanism of the cell or whether there is a loss in body control of cell activity. This investigation of the characteristics of the cancer cell belongs in the field of cell physiology, and it is felt that an important function would be served if this line of study were stressed.

Greulich, W. W., & Burford, T. H. (1936). **Testicular Tumors Associated with Mammary, Prostatic, and other Changes in Cryptorchid Dogs.**—*Amer. J. Cancer.* **28.** 496–511. [Authors' summary copied *verbatim*].

Three cases of cryptorchidism in the dog are described. In all three animals an undescended testis had become transformed into a tumor and was associated with changes in the mammary glands and in the prostate somewhat similar to those which may be evoked experimentally by the injection of theelin. Two of the animals were sexually attractive to male dogs and one of them from which the tumor was removed surgically lost that attractiveness following the operation. No information on this point was available in the case of the third dog. Biological assays of the tumor of the first dog for gonadotropic, and of the tumor of the second animal for estrogenic, hormones were negative. The negative results are not to be considered

as conclusively establishing the absence of the substances they purported to assay, for they may have been due to inadequacies of the extraction methods employed.

In all three animals there was a sparsity of hair and an increased pigmentation of the skin over the abdomen. The extent of these integumentary changes in each dog seemed to be roughly proportional to the severity of changes observed in its adrenal glands.

ALLEN, A. C. (1940). **So-Called Mixed Tumors of the Mammary Gland of Dog and Man. With Special Reference to the General Problem of Cartilage and Bone Formation.**—*Arch. Path.* **29.** 589–624. 11 figs. [Numerous refs.] [Author's summary copied *verbatim*].

Four so-called mixed tumors from mammary glands of dogs and one from a human breast are described. These tumors contain myxomatous tissue, cartilage, osteoid tissue and bone. The tumor of the human breast is a fibromyxochondrosarcoma. Three of the canine tumors are carcinomas; the fourth is a sarcoma.

Contrary to the generally held concepts of the specificity of germ layers, the cartilage in three of the canine neoplasms appears to be *derived directly from adult epithelium.* The transition stages of the conversion of the epithelium into cartilage are easily followed and consist of (1) loosening of the acinar epithelium, (2) isolation of the epithelial cells in a matrix so as to simulate myxomatous tissue, (3) collagenization of the mucoid matrix and (4) homogenization and lacunar formation.

This " epithelial cartilage " is considered to be true cartilage as judged by known morphologic, biochemical (pancreatic digestion) and tinctorial criteria.

The development of fibrocartilage from mature, sclerotic collagenous tissue rather than directly from immature mesenchymal cells has been observed and its significance indicated.

A mechanistic theory of intramembranous ossification is outlined which accounts for both normal and heterotopic ossification without the use of the traditional vitalistic hypothesis of specific osteoblasts and ubiquitous undifferentiated mesenchymal cells.

Reasons favoring the nonspecificity of chondroblasts and osteoblasts are presented, with emphasis on the importance of environmental factors, in agreement with the " newer " mechanistic embryology.

The term " mixed tumor " as applied to this type of neoplasm is misleading and, if used at all, should be reserved for tumors composed of dysontogenetic tissues, such as organoid teratomas. " Myxo-," " chondro-," " osteoid-" or " osteo- " should be added to " carcinoma " or " sarcoma " to designate the type of tumor described here when the myxo, chondro, osteoid or osseous tissue is a direct modification of the tumor tissue. The presence of heterotopic stromal chondrification or ossification should of course not be indicated by qualifying adjectives.

Considerations similar to the foregoing are obviously applicable to other tumors of this type—for example, the so-called mixed tumors of the salivary glands.

Reasons for the strikingly high incidence of cartilage and bone in tumors of the mammary glands of dogs as contrasted with man are given. These are based on the liability of the former to trauma, with resulting necrosis, hemorrhage, inflammation and edema, and on the retiform pattern of the canine acinar epithelium.

PYBUS, F. C., & MILLER, E. W. (1938). **Spontaneous Bone Tumours of Mice.**—*Amer. J. Cancer.* **33.** 98–111. 4 figs., 8 tables. [3 refs.] [Authors' summary copied *verbatim*].

A description is given of the derivation from 2 mice of Simpson Strain 3, of a selected inbred branch in which the incidence of bone tumours is very high. A brief account is given of the main types and sites of these sarcomata and their age-distribution.

DES LIGNERIS, M. J. A. (1940). **The Production of Benign and Malignant Tumours in Mice Painted with Bantu Liver Extracts.**—*Amer. J. Cancer.* **39.** 489–495. [Author's summary copied *verbatim*].

Benign and malignant skin tumours (papillomata and epitheliomata) were produced in mice painted with extracts of cancerous and noncancerous Bantu livers. The possible significance of these results is discussed.

HIEGER, I. (1940). **The Examination of Human Tissue for Carcinogenic Factors.**—*Amer. J. Cancer.* **39.** 496–503. 6 figs., 1 table. [10 refs.] [Author's summary copied *verbatim*].

Eleven spindle-celled tumours were obtained in 367 mice receiving subcutaneous injections of various extracts of European and Bantu livers.

MENN, L. S., & WELKER, W. H. (1940). **A Specific Precipitin Antiserum for Carcinoma Protein.**—*Amer. J. Cancer.* **39.** 360–364. 4 tables. [11 refs.] [Authors' summary copied *verbatim*].

Specific precipitin antiserum has been prepared for proteins of carcinoma tissue. The proteins of carcinoma tissue are specific. The proteins of carcinoma tissue may appear in the blood stream of the patient with carcinoma and be detected with the appropriate antiserum.

JACOBI, H. P., & BAUMANN, C. A. (1940). **The Effect of Fat on Tumor Formation.**—*Amer. J. Cancer.* **39.** 338–342. 3 tables. [13 refs.] [Authors' summary copied *verbatim*].

Tumors were produced in a large series of mice by the local application of benzpyrene, methylcholanthrene, or dibenzanthracene. Diets containing 15 per cent or more of fat accelerated the rate of tumor production. The acceleration was observed on each of five different fats, with three different types of basal ration, and with two strains of animals. It appeared, therefore, to be a general one. It could be duplicated only in part by the local application of fat to the areas in which tumors were forming.

RIVERS, T. M., WARD, S. M., & SMADER, J. E. (1939). **Infectious Myxomatosis of Rabbits. Studies of a Soluble Antigen Associated with the Disease.**—*J. exp. Med.* **69.** 31–48. 7 tables. [12 refs.] [Authors' summary copied *verbatim*].

The soluble antigen of myxoma is a heat-labile protein which has an isoelectric point near pH 4·5 and is precipitated from half saturated solutions of ammonium sulfate. It can be partially purified by methods of differential precipitation based on variations in the pH and electrolyte concentration.

Rabbits receiving the labile, soluble substance of myxoma develop homologous precipitins and their serum agglutinates elementary bodies of myxoma, provided the dermal pulp from which the bodies are obtained contains the soluble substance; neutralizing antibodies do not appear, however, and the animals are not resistant to infection with the virus of myxoma.

Elementary bodies of myxoma appear to have a heat-stable agglutinogen that operates when brought in contact with serum from animals recovered from myxoma, but little, if at all, when in contact with anti-soluble substance serum.

FRIEDEWALD, W. F., & KIDD, J. G. (1940). **Union in vitro of the Papilloma Virus and its Antibody.**—*J. exp. Med.* **72.** 531–558. 11 tables. [16 refs.] [Authors' summary copied *verbatim*].

Experiments are described which show that the rabbit papilloma virus elicits an antibody of one type only, this being capable both of neutralizing the virus and of fixing complement in mixture with it. The virus and its antibody have a powerful, specific affinity for one another, each being capable of absorbing the other in great excess when they are brought together in the test tube. The union formed by them *in vitro* cannot be dissociated in any demonstrable degree by dilution or centrifugation.

In many respects the findings differ from those with most viruses previously studied.

KIDD, J. G. (1939). **The Masking Effect of Extravasated Antibody on the Rabbit Papilloma Virus (Shope).**—*J. exp. Med.* **70.** 583–604. 6 figs. on 2 plates, 3 tables, 6 graphs, 6 charts. [10 refs.] [Author's summary copied *verbatim*].

The foregoing experiments have shown that the causative virus is usually " masked " in the large, disorderly, fissured and inflamed papillomas of cottontails when antiviral antibody is present in quantity in their blood, though virus can be recovered as a rule from the smaller, discrete, well ordered papillomas of these rabbits, almost irrespective of the amount of antibody in the blood of the individuals bearing them. Other findings are described which indicate that the masking of the virus in the large fissured growths is due to serum antibody present in them as result of exudation or hemorrhage, which neutralizes the virus when the growths are extracted or preserved *in vitro*. The local conditions that favor extravasation of serum (and the accumulation of antibody) prevail as a rule in the large, confluent growths arising after virus has been sown broadcast on scarified skin, but to lesser extent or not at all in the discrete papillomas that occur naturally or as a result of tattoo inoculation.

The state of affairs is notably different in the papillomas of domestic rabbits. The virus is regularly masked in these, and usually masked completely, even when there is little antibody in the blood and the local conditions do not favor its extravasation into the growths. The findings indicate that something other than antibody is primarily responsible for the masking in this species.

NUTRITION IN RELATION TO DISEASE

LEITCH, I. (1940). **The Feeding of Camels.**—*Tech. Comm. Imp. Bur. Anim. Nutrit., Aberd.* No. 13. pp. 35. 7 tables, 3 appendixes. [Numerous refs.]

A general outline is presented on distribution of camels, the value of their products, their general feeding habits and nutritional requirements. The practice in regard to salt feeding and watering is discussed, particularly in view of the findings of PECK [*V. B.* **10.** 707.], and physiological aspects of the relationship are considered.

By comparison with accepted feeding standards for other ruminants it is shown that common practice falls far short in the case of the camel, and that rations adopted even by experienced camel officers may sometimes be inadequate. It is suggested that in addition to general undernutrition camels frequently have a vitamin A deficiency. With regard to salt requirements, the high salt content of certain salt bushes habitually grazed by camels provides enough, but on prescribed rations salt may be so deficient as to lead to dehydration and poor condition, and to predispose to other disorders. PECK's suggested allowance of 5 oz. of salt per day for hand-fed camels is recommended. In contrast to salt deficiency is mentioned the "saltwort paralysis" occurring when grazing is limited for very long periods (years) to bushes of very high salt content.

Three useful appendixes and seven tables deal with the composition of camel fodder plants, the composition and digestibility of foods used in camel rations, supplementary rations in addition to grazing, rations of camel corps, and concentration of salt in the total water of rations. A bibliography is given and special acknowledgements are made to LEESE's "Treatise on the One-Humped Camel" (1927), from which much of the information is condensed and combined with data obtained from the Directors of Veterinary Services and Agriculture in the Sudan, Iraq, Palestine, and Nigeria. As a compact bulletin the publication should arouse fresh interest in a neglected agricultural animal still capable of holding its own against mechanical transport on the outskirts of civilization.—H. H. GREEN.

I. ROBISON, W. L. (1940). **The Effect of a High Protein Ration on Pigs.**—*2nd Nutrit. Conf. Vet., 1939.* pp. 45–48. 2 tables, 3 photographs. Fort Wayne, Indiana: Central Soya Co., Inc.

II. SCHALK, A. F. (1940). **A Discussion of the So-called Protein Poisoning in Swine.**—*Ibid.* pp. 49–54. 1 photograph. Fort Wayne, Indiana: Central Soya Co., Inc.

III. SCHALK, A. F. (1940). **So-called Protein Poisoning in the Feeding of Swine.**—*Proc. 43rd ann. Meet. U. S. Live Stk sanit. Ass. 1939.* pp. 245–254. Discussion pp. 254–256.

I. A litter of eight pigs, 16 weeks old, was divided into two equal groups. One group received a ration consisting of meat scraps, herring meal, soya bean meal, cottonseed meal, lucerne and maize, and containing 42·1% protein; 0·5% cod liver oil was incorporated later. The animals in this group scoured somewhat throughout, but their appetites remained unimpaired and their average individual gain in weight over a period of 13 weeks was 1·34 lb. per day. The second group was given alternating periods of a low protein (8·8%) ration alone, and of this plus a concentrate (55% protein) which was placed in a separate compartment of the self-feeder employed. The protein concentrate was freely consumed during the periods at which it was available to the second group, but no harmful effects followed its consumption, and the growth rate was much better at these times than when the low protein ration only was being fed. At the conclusion of the experiment, all 16 animals were slaughtered and subjected to a careful P.M. examination. No macroscopical lesions were detected.

II. A number of American veterinarians have apparently been making field diagnoses of "protein poisoning" in certain cases of illness in pigs [see also *V. B.* **10.** 379]; the symptoms, in so far as they have been reported, appear to be variable and not significantly diagnostic of any one specific condiiton. S. discusses the findings of those who have reported the condition, and refers to high-protein feeding experiments in rabbits, rats, and man, and to those described in I. He concludes that there are no grounds for associating any such cases with a high level of protein intake, and implies that such diagnoses of "protein poisoning" are not only mistaken, but are sometimes deliberately false. It is stated that little is known of the problem of food allergy in farm

animals, and the condition usually occurs as an individual idiosyncrasy rather than a generality in a flock or herd.

III. Comprises the entire substance of II, together with an extended discussion of I. In the discussion which followed, KERNKAMP expressed the view that, of all proteins likely to be ingested by pigs, the toxalbumins alone could be classed as poisons.—A. N. WORDEN.

HULL, F. E., & NOLAN, A. F. (1940). **Acetonemia in Swine.**—*J. Amer. vet. med. Ass.* **97.** 162–164. 2 tables. [8 refs.]

Three cases of acetonaemia in swine are reported. Two animals were taken ill a few weeks after farrowing and showed emaciation and staggering gait. The third, a gilt, showed the same symptoms but was in good condition. On P.M. examination fatty degeneration of the liver and kidneys were noted in each case, the other organs being normal. Total ketone bodies in the blood taken immediately before slaughter varied between 5·5 and 35·0 mg. per 100 c.c. and in the urine between 5·6 and 96·8 mg. per 100 c.c. A definite hypoglycaemia existed and an abnormal increase in the total blood N.P.N. was also found.—J. A. N.

HALLGREN, W. (1939). Om etiologien och patogenesen vid paresis puerperalis hos nötkreatur. [**Aetiology and Pathogenesis of Milk Fever**].—*Skand. VetTidskr.* **29.** 253–268. [17 refs.] Discussion pp. 268–271. [English summary].

H. has found that the calcium content of venous blood taken from the mammary vein in cows with milk fever is lower than that of their jugular vein blood. He has also observed that the carotid blood pressure of affected cows is often markedly subnormal [general statements only: no protocols]. An attempt to link up milk fever with barometric conditions has been without any significant result.—J. E.

SANKARANARAYAN, N. S. (1940). **Haematological Studies in the Indian Dairy Animals. Structural Changes with Mineral Feeding.**—*Indian vet. J.* **17.** 24–32. 3 tables, 2 graphs. [17 refs.]

Red blood cell counts and examination for unusual blood elements were made on two Indian dairy cattle maintained on an adequate diet supplemented with phosphates of Ca, Na, and NH_4 in succession. Each period of phosphate feeding lasted four weeks at each of two levels of intake and at the end of each period the blood samples were taken. Both animals showed some degree of anaemia at the beginning of the experiment, but with the feeding of the Ca and Na phosphates the blood picture improved concurrently with increase in weight of both animals. S. thereby assumes that phosphates contribute a great deal to the regeneration of blood in anaemic animals.

—ALFRED EDEN.

DACIE, J. V. (1940). **The Effect of Iron Deficiency on the Fragility of Rat Erythrocytes.**—*J. Path. Bact.* **50.** 541–548. 1 fig., 1 table. [9 refs.]

Five young rats were maintained on a diet low in Fe and five on the same diet supplemented with Fe and Cu. Estimations were made periodically over eight weeks of the blood Hb content and of the median corpuscular fragility (expressed as g.NaCl%). The Fe deficient rats showed a significant lowering of the Hb and decreased erythrocyte fragility, as compared with the controls. The fragility of rat erythrocytes appears to be a variable characteristic of the species.—ALFRED EDEN.

ABBOTT, O. D., & DE MASTERS. (1940). **Choline in the Diet of Chickens.**—*J. Nutrit.* **19.** 47–55. 3 tables. [10 refs,]

The effect was investigated of feeding lecithin or choline to chicks and pullets as a supplement to a basal diet composed of dried skim milk, rice, grit, and the necessary vitamins. The results show that when 75 mg. of choline were given daily, pullets produced more eggs and there were fewer aborted yolks than when 25–50 mg. were given. Mortality was decreased among birds receiving choline supplements and the percentage of fatty acids in the livers was much less than in those on the basal diet. The concentration of fatty acids in the livers of males, with or without added choline, was considerably lower than that in the livers of the pullets fed the same rations.—R. ALLCROFT.

FOOT, A. S., HENRY, K. M., KON, S. K., & MACKINTOSH, J. (1939). **Pig-Feeding Experiments with Cod-Liver Oil.**—*J. agric. Sci.* **29.** 142–163. 2 figs. on 1 plate, 13 tables. [8 refs.]

Six litters of pigs were reared and fattened on a ration of barley meal, wheatings, soya bean meal, meat meal and minerals, the sows receiving the same ration for a period of two weeks before farrowing. In every case the young pigs developed symptoms which were essentially those of a vitamin A deficiency

[*V. B.* **9.** 494.], and in addition the ash content of the ribs showed a slight but significant decrease as compared with that of pigs receiving cod liver oil in the ration. Estimations of vitamin A in the livers indicated that reserves were depleted shortly after weaning. The addition of 1 or 2 % of cod liver oil to the ration of 11 clinically affected pigs resulted in a disappearance of symptoms, apart from a slight awkwardness of the gait in some cases.

Six further litters were raised under similar conditions and on the same basal diet, but cod liver oil supplements comprising 0·5, 1, or 2% of the ration were added. The pigs were reared normally and the vitamin A content of the livers was found to increase gradually as the pigs grew. There appeared to be no evidence that the higher levels of cod liver oil possessed any advantage over the addition of 0·5% as a practical supplement.—A. N. W.

GUILBERT, H. R., HOWELL, C. E., & HART, G. H. (1940). **Minimum Vitamin A and Carotene Requirements of Mammalian Species.**—*J. Nutrit.* **19.** 91–103. 1 fig., 4 tables. [12 refs.]

Twelve purebred Percheron horses, which varied in age from 119–444 days at the commencement of the experiment, and which had previously received normal rations, including lucerne hay and pasture grass, were restricted to diets low in carotene. Straw was included in the basal ration of the first four animals, but was omitted from that of the remainder in order to reduce further the carotene intake. It is stated that the animals thrived without the addition of roughage, but that they showed a propensity for chewing fences and mangers, which had to be protected with wire and metal strips.

As in the case of other species, night blindness was the first detectable symptom of vitamin A deficiency; it occurred in from 265–439 days in the animals not receiving straw, and in from 492–627 days in those receiving straw as part of the basal ration. It is stated that the acute sense of direction possessed by the horse tended to mask the visual defect, but, when completely night blind, the animals carried their heads high, with nose extended, or close to the ground, feeling their way around. In animals in which the deficiency was allowed to progress further, the coat became roughened, there was excessive lachyramation, and keratinization occurred in the deeper layers of the cornea. There was some nervous irritability, but no tendency to convulsions, while oestrus and the sexual impulse did not appear to be diminished. Liver vitamin A reserves were non-existent in the case of three animals allowed to die *in extremis*.

Varying doses of carotene, as lucerne meal, or of vitamin A, as cod liver oil, were given to the remaining animals; the minimum level for carotene was 20–30 μg, and for vitamin A it was 4·2–5·3 μg per kg. body weight. The results are discussed and summarized in comparison with those previously obtained in other species [see *V. B.* **9.** 575]. The minimum requirements per kg. body weight for cattle, sheep, and swine were found to be 4·3–6·4 μg vitamin A and 25–39 μg carotene. These data, together with those for the horse and rat, are tabulated and expressed both by weight and in international units. They are discussed in relation to human and animal nutrition, and it is pointed out that separate standards for the vitamin A and the carotene requirements of mammals are needed, since the ratio of the relative efficiencies of these two substances varies with the intake, a relatively greater intake of carotene being required for optimum, rather than minimum, nutrition.—A. N. WORDEN.

CARLSTRÖM, B., & JONSSON, G. (1939). B_1-avitaminos hos marsvin. Dess förhållande till marsvinsdödligheten. [**Avitaminosis-B_1 in G. Pigs**].—*Skand. Vet-Tidskr.* **29.** 181–190. 2 diagrams. [English summary].

In an investigation into mortality in stocks of g. pigs towards the end of winter in mid-Sweden, the authors, suspecting avitaminosis, carried out three feedings experiments with the stock food of the g. pigs in question—swedes and hay, and also with hay of known low vitamin B_1 content, with irradiated and non-irradiated yeast and with cod liver oil in various combinations. It was determined that the hay in question had quite a high vitamin B_1 content (600 I.U. per kg.) and so, if the sample of hay was representative, the deaths were not due to avitaminosis B_1. In practice however, the losses were stopped by the feeding of a dry, non-irradiated yeast supplement.

In further experiments g. pigs fed on swedes and hay with a very low vitamin B_1 content (150 I.U. per kg.) developed muscular cramps and paralysis, and some died after about 30 days. Non-irradiated yeast seemed to protect against this, but cod liver oil was definitely harmful as animals given it died relatively

quickly. Affected g. pigs could be saved by a dose of aneurin (B_1).—J. E.

LUNDE, G., & KRINGSTAD, H. (1940). **The Anti Grey Hair Vitamin, a New Factor in the Vitamin B Complex.**—*J. Nutrit.* **19.** 321–332. 7 figs., 1 table. [17 refs.]

Evidence is presented indicating that in addition to the known factors of the B complex *viz*, thiamin (B_1), riboflavin (B_2), nicotinic acid, pyridoxin (B_6), and pantothenic acid or the chick antidermatitis factor, there are two other members of the complex present in the filtrate after an extract of liver is treated with fuller's earth. One of these is a rat growth factor, designated B_w, which may be identical with the "factor W" of ELVEHJEM *et al.* [*V. B.* **10.** 786.] and the other, B_x, is necessary to prevent and to cure the greying of black hair in rats. Both these factors are present in liver and yeast in large amounts.

Precipitation and solubility tests with various reagents, and the differences in their heat stability, show that the two factors are quite distinct; also the greying of fur occurs in rats subsisting on certain diets whether they exhibit adequate growth or not. That the anti-grey hair factor is distinct from other known members of the B complex is supported by the evidence of OLESON, ELVEHJEM and HART [*V. B.* **11.** 121].—R. ALLCROFT.

LUNDE, G., & KRINGSTAD, H. (1939). Bedarf des Fuchses an dem Anti-Grau-Haar-faktor, Vitamin B_x. [**Studies on the Anti-Grey Hair Vitamin for Silver Foxes**].—*Naturwissenschaften.* **27.** 755. [6 refs.]

Previous work of the authors [see preceding abst.] showed that the dark hair of rats becomes grey when a particular "heat-labile filtrate factor" of the vitamin B complex, designated as B_x, is absent from the diet. The present paper shows that the silver fox also requires this factor to maintain normal colouring and that in its absence the black hair begins to go grey after 8–10 weeks, particularly on the snout. The experimental diet consisted of a basal ration to which yeast extract autoclaved at alkaline reaction to destroy B_x was added, along with thiamin to replace concomitant destruction of B_1. On a similar diet adequate in B_x, other foxes from the same litter suffered no change in hair colour.

The "sandy" variation of colour in young cubs described by SCHOOP, and frequently associated with "grey snout" in older foxes, is also explained as due to deficiency of vitamin B_x, and not to lack of vitamin C as believed by SCHOOP. According to MATHIESEN foxes do not require vitamin C, and young foxes fed on diets free from it, from the 11th–24th week of life, showed no change in hair colour.—H. H. G.

MORGAN, Agnes F., & SIMMS, Helen D. (1940). **Greying of Fur and Other Disturbances in Several Species Due to a Vitamin Deficiency.**—*J. Nutrit.* **19.** 233–250. 3 figs., 2 tables. [15 refs.]

Rats fed a basal diet adequate except for the B vitamins, and supplemented by thiamin, riboflavin, and B_6 developed greying of the fur within 6–10 weeks. Growth on this diet was variable but usually subnormal. Filtrates from fuller's earth treated extracts of rice bran, yeast, liver, crude cane molasses, and alfalfa restored the colour of the fur, and also improved the growth in varying degrees; cane molasses and alfalfa extracts induced rapid growth but late and incomplete cure of greyness, while rice bran and liver filtrates had less effect on growth but caused rapid darkening of the fur. From this it appears that two filtrate factors are involved [see first paper by LUNDE and KRINGSTAD above], the anti-grey hair factor and the rat-growth factor. In addition to the greying of the fur some of the rats developed a dermatitis unlike that due to specific B_6 deficiency, and in some cases persistent large skin ulcers appeared which healed after a yeast filtrate factor was fed.

The effect of the injection of adrenalin, and adrenal cortex and thyroid extracts was tried. The adrenal cortical extract was most effective, but all three extracts appeared to have some effect although the darkening of the fur in all cases was accomplished much more slowly than with potent filtrate preparations. Histological studies were made of the adrenals, thyroids, testes, and skin of animals on the basal diet and of animals on diets deficient in riboflavin and B_6. Serious damage occurred in these tissues in the rats which developed grey hair, but corresponding changes did not occur in rats on the riboflavin or B_6 deficient diets.

Lactation failed nearly completely in all rats on the basal diet deficient in the filtrate factor or factors.

The hair of several g. pigs and dogs became dull and metallic in appearance and some developed a definite greyness after subsisting on this deficient diet. The growth of the dogs was

subnormal and occasional diarrhoea occured.

The possible interrelation of the hormones and the B complex, and the relation of senescent changes to this vitamin deficiency are discussed. —R. ALLCROFT.

SCHNEIDER, H., STEENBOCK, H., & PLATZ, Blanche R. (1940). **Essential Fatty Acids, Vitamin B_6, and other Factors in the Cure of Rat Acrodynia.**—*J. biol. Chem.* **132.** 539–551. 2 figs., 8 tables. [12 refs.]

Weanling rats fed on a fat-free, vitamin B_6 deficient diet developed acrodynia in 4–5 weeks. Various materials to be tested for anti-acrodynic potency were fed as supplements to this diet. The results showed that acrodynia in the rat can be cured by two different means :– (1) The anti-acrodynic potency of certain fats was shown to be due to the unsaturated fatty acids of which linoleic acid is representative. This action is independent of vitamin B_6 as these fatty acid preparations contained no B_6. (2) Cure was effected by rice bran concentrate which depends for its curative action on the presence of B_6 plus a second "accessory factor", which has been demonstrated in the filtrate from the fuller's earth treatment of rice bran concentrate. This action is independent of fatty acids.

Vitamin B_6, both in crude preparation and in crystalline form, had only a temporary effect on acrodynia in the absence of the "accessory factor".—R. ALLCROFT.

KNIGHT, C. A., DUTCHER, R. A., GUERRANT, N. B., & BECHDEL, S. I. (1940). **Destruction of Ascorbic Acid in the Rumen of the Dairy Cow.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 90–93. 2 figs. [7 refs.]

A rumen fistula was made in a Friesian cow, and the normal blood-plasma, milk, and urine ascorbic acid values were then determined. On two occasions, 100 and 150 g. respectively of synthetic ascorbic acid were fed in maize silage, and on a third occasion 100 g. were placed directly into the rumen through the fistula. In each case the blood-plasma and milk ascorbic acid values remained unchanged, although there appeared to be a slight increase in the urinary ascorbic acid excretion during the 24 hours following the doses.

Removal of samples of the ruminal contents showed that there was a rapid and progressive destruction of the ascorbic acid ; this was confirmed by *in vitro* tests, in which ascorbic acid was added to material freshly removed from the rumen.—ALASTAIR N. WORDEN.

ANDERVONT, H. B., & SHIMKIN, M. B. (1939). **The Effect of Ascorbic Acid Upon the Hemorrhage Produced by Bacterial Filtrate in Transplanted Tumors.**—*Amer. J. Cancer.* **36.** 451–459. 2 figs., 5 tables. [18 refs.]

The parenteral injection of a bacterial filtrate into an animal bearing a transplanted tumour may be followed by changes in the tumour itself. The most striking of these changes is haemorrhage, which, when marked, may be followed by regression of the tumour. It was known that the production of such haemorrhages was accompanied by a marked fall in the ascorbic acid content of the tumour, and the authors decided to test the hypothesis that the haemorrhage and resulting changes were due to capillary fragility arising from local ascorbic acid deficiency.

Single subcutaneous injections of 50 mg. of ascorbic acid were found to inhibit the production of haemorrhages in transplanted sarcomas of mice which had just previously received 0·1 ml. of an undiluted filtrate of *Chromobacterium prodigiosum*, and the reaction was shown to be proportional by using varying amounts of ascorbic acid and of filtrate. Adjustment of the ascorbic acid solution to pH 6·0 did not inhibit its activity in this respect, and monoethanolamine was also active. Subcutaneous injection of acetic acid did not influence haemorrhage production, but cystein hydrochloride, used on account of its strong reducing properties, prevented the haemorrhage in the majority of instances. It is therefore suggested that the activity of the ascorbic acid is due to its reducing properties.—A. N. W.

CARRUTHERS, C. (1939). **Vitamin E and Experimental Tumors.**—*Amer. J. Cancer.* **35.** 546–553. 6 tables. [5 refs.]

Mice of two pure strains were given from weaning synthetic basal diets containing casein, lard, starch, salts, and adequate supplies of the vitamins except E. Some were fed a diet containing rancid lard which destroys even traces of E ; both diets were shown, by the occurrence of resorptions in pregnant females, to be deficient in vitamin E. Two groups of young mice received the basal diet only, whereas two further groups received supplements of a vitamin E concentrate in amounts equivalent to those necessary to ensure normal pregnancy in older females receiving the basal

diets. At 3–4 months of age, the response of the four groups to the subcutaneous injection of methylcholanthrene was determined, and it appeared that the presence or absence of vitamin E was immaterial. The type of tumour produced by the methylcholanthrene was investigated; contrary to the findings of most other workers who have reported sarcomas, about 30% of all mice were found to have developed epidermoid carcinomas.

Some 85% of females of one of the strains employed normally develop spontaneous mammary tumours; this figure was approximated in all cases in which the non-rancid diet, with or without vitamin E, was fed. Of 23 mice receiving the rancid diet, however, two only developed mammary tumours. It has not yet been determined whether this is due to the lack of vitamin E or to some other dietary influence.

—ALASTAIR N. WORDEN.

PUBLIC HEALTH

FRANK, L. C. (1939). **Engineering Problems in Milk Sanitation.**—*Publ. Hlth Rep., Wash.* **54.** 513–527. 7 figs.

Greater use should be made of the sanitary engineer in the supervision of the milk industry. In the U.S.A. only 17 whole-time and 75 part-time sanitary engineers are employed by the State Boards of Health, whilst 14 whole-time and 36 part-time persons are thus employed by the Local Boards of Health.

A résumé of the work which could be undertaken is given with regard to farm premises and processing plants. The layout and faults which are likely to arise in connexion with pasteurization plants are discussed.

Pasteurization has increased rapidly within recent years, 83% of towns in the U.S.A. having a population of over 10,000 and 73% of communities of 1,000 and over demanding that all milk should be pasteurized.—H. E. B.

ISAACS, M. L., & NUSSBAUM, M. (1940). **Comparative Study of the Bacterial Flora of Grade A and Grade B Milk in New York City.**—*Amer. J. publ. Hlth.* **30.** No. 9. Suppl. p. 1–22. 17 tables. [7 refs.]

The work was undertaken for a year in consequence of the proposal to abolish grades A and B milk in New York City. In most respects the regulations governing these grades were identical; the chief differences being the limits specified for bacterial counts and the temperatures at which the milk should be kept.

Using the new medium for the standard methods count of the American Public Health Association, agar-plate counts of raw grade A gave monthly means of 22,000–300,000 whilst grade A pasteurized gave means of 450–2,400. The means for grade B were:—raw 160,000–890,000 and pasteurized 8,400–21,000. The new medium raised the counts especially of grade B milk samples, whilst grade A milk samples were shown to be the more uniform products. Pasteurization reduced the counts more in grade A than in grade B milk.

—H. E. BYWATER.

MIHAÉLOFF, S. (1939). Le rôle du lait dans la dissémination des germes pathogènes en Egypte. [**Organisms Disseminated by Milk in Egypt**].—*Ann. Hyg. publ., Paris.* **17.** 351–356. 1 table.

A general note on the absence of modern hygienic conditions in milk distribution in Egypt, with notes on pathogenic bacteria isolated from 200 market milk samples.

TACU, D. C. (1939). Frecventa bacilului tuberculos in laptele si branza de vaci de pe piata Bucurestiului. [**Frequency of *Mycobacterium tuberculosis* in Samples of Milk and Cream Cheese Sold in Bucarest**].—*Arhiva vet.* **31.** No. 4–5. 42–46. [17 refs.] [Abst. from German summary].

Four out of 90 milk samples taken at Bucarest market were infected by tubercle bacilli according to g. pig inoculation tests, but in 16 cases the animal died prematurely so that a reliable result was not obtained. One out of 52 samples of cheese similarly tested was infected. The g. pig test is more reliable than the culture test on Löwenstein's medium.

DAVIES, B. (1940). **The Efficiency of Commercial Pasteurisation and the Phosphatase Test.** pp. 40. London: United Dairies Ltd.

1,544 samples of pasteurized milk, taken at random by various local authorities' inspectors, were submitted to the phosphatase test. Only 32 samples exceeded the limit indicative of efficient pasteurization as recorded in Lovibond Blue Units in conjunction with the Lovibond Tintometer.

The test is extremely delicate and must be carried out under the supervision of a trained chemist. Unless the precautions indicated during sampling, storage, and testing are rigidly adhered to, false interpretations may result.—H. E. BYWATER.

ANON. (1940). **Is Goats' Milk Safe?**—*Brit. med. J.* Sept. 7th. 326.

In support of the greater use of goat's milk it is stated that the risk of *Brucella melitensis* infection from goats in Great Britain is negligible. Whilst 40% of the dairy cattle are infected with tuberculosis, it is stated that the goat is "very refractory in nature" to this disease.—H. E. BYWATER.

WINTHER, O., & NIELSEN, E. L. (1939). Brintjonkoncentrationsmaalinger i Kød og Kodvarer med saerligt Henblik paa Vaerdien ved Kodkontrollen. [**pH Estimation at Meat Inspection and Its Significance**].—*Skand. VetTidskr.* **29.** 1018–1064. 19 tables. [Numerous refs.] [Abst. from authors' English summary].

High pH values are seldom found in inspected meat. When they do occur the meat has usually to be condemned on account of other pathological-anatomical changes. Systematic pH-determinations are therefore of little value for meat control or for judging whether stored meat is putrid or not. This can be determined more reliably by the smell than by pH-determination. The determination of the pH-value in minced meat is also of little value.

It is stated, however, that the determination of the pH-value may sometimes be of some value.

VAN DEN ENDE, M., LUSH, Dora, & EDWARDS, D. G. ff. (1940). **Reduction of Dust-Borne Bacteria by Treating Floors.**—*Lancet.* **239.** 133–134. 2 tables. [5 refs.]

Reference is made to the importance of dust as a factor in infection and to the fact that haemolytic streptococci may remain viable in dust for several weeks, and that dust-borne bacteria are, in the main, relatively resistant to ultra-violet light and to chemical aerosols [see also *V. B.* **10.** 620]. Viable haemolytic streptococci were recovered in large numbers from infected blankets of patients for periods of up to one month. Air sterilization is unlikely to be effective unless dust is controlled.

Two rooms, one having a floor covered with linoleum and the other having the floor boards treated with a light application of crude oil, had infected blankets beaten in them. When the rooms were swept, the linoleum covered room had large numbers of bacteria in the air whilst the other room had comparatively light air contamination. The dust in the treated room was sticky and matted and thus held bacteria in the dust particles. The amount of oil used was small and remained effective for ten days even after washing once or twice.

[Many food product manufacturers have long realised the harmful effects of dust-borne micro-organisms on the keeping qualities of their products, especially meat products. They have overcome the problem by oiling wooden floors and by keeping impervious floors wet with water. Ventilation in such factories is so arranged that air is forced in at a high level and directed on to the floor whilst the outflow of air is at ground level (the opposite to natural ventilation.)]—H. E. BYWATER.

THERAPEUTICS

—. (1939). **Foreign Pharmaceutical Products. British Equivalents and Alternatives.**—*Brit. med. J.* Oct. 28th. 868–875.

This gives a list of the British equivalents of many foreign pharmaceutical products, the chemical nature of the products, and the names of the British makers and suppliers.—J. M. R.

I. —. (1940). **Medical Research Council. Therapeutic Requirements Committee. List of Drugs for Veterinary Use as Revised at the Meeting on 5th November, 1940.** pp. 7. London: Medical Research Council. [fcp] [Mimeographed].

II. —. (1940). **Medical Research Council. Therapeutic Requirements Committee. Memorandum on Economy in the Use of Drugs.** pp. 20. London: Medical Research Council. [fcp] [Mimeographed].

III. —. (1940). **Purchase Tax: Proposed List of Essential Drugs.**—*Brit. med. J.* Sept. 28th. 427.

I. This is a list of drugs compiled by the Therapeutic Requirements Committee of the M.R.C. for the benefit of producers and users of the drugs. The list includes the names of:– a. Drugs which are either (1) readily available at present or (2) regarded as essential; b. drugs which are essential for certain purposes but the use of which should be restricted, and c,

drugs which are not essential and do not justify importation or manufacture in war time.

In the case of some drugs previously made by firms in enemy-controlled countries, the names of British made identical or similar preparations are given, so that the cessation in supply of the former does not necessarily result in certain diseases becoming uncontrollable—for instance, " pirevan " is a substitute for acaprin, the best remedy for piroplasmosis in domestic animals. The list also includes notes on the country of origin of some drugs.

II. This is a corresponding list of drugs used in human medicine : it includes numerous drugs also used in veterinary medicine, so should be referred to along with I.

III. A list of drugs, vaccines, etc. which have been exempted from the purchase tax, which was imposed on a wide range of goods as a part of war finance.—J. E.

I. —. (1940). **Sulphathiazole.**—*Brit. med. J.* June 22nd. 1022–1023. [7 refs.]

II. —. (1940). **Sulphathiazole.** — *Lancet.* **238.** 883–884. [7 refs.]

I & II. These are provisional discussions of the value of the new sulphonamides, sulphathiazole and sulphamethylthiazole. The former appears to be less toxic than sulphapyridine but the latter is more toxic. Sulphathiazole has less tendency than sulphapyridine to produce nausea, vomiting, and cyanosis ; the two drugs are about equally effective against pneumococcal and some other infections. The chief interest of the new drugs lies in the possibility that they may be effective against staphylococci, and the methyl compound appears to be superior to sulphathiazole in this respect. *In vitro* inhibition of the growth of staphylococci can be produced, and the course of the infection in mice inoculated with staphylococci can also be favourably influenced. Clinical evidence is not so far very encouraging, but it has been shown that moderate doses of sulphathiazole will render the urine bactericidal for *Staphylococcus aureus* and *Streptococcus faecalis.* Sulphathiazole will also usually control a localized staphylococcal infection, such as carbuncle or osteomyelitis. Sulphathiazole is readily absorbed from the bowel and quickly excreted, while a smaller percentage of the drug becomes acetylated and inert than is the case with sulphapyridine. A concentration of 3–5 mg. % in the blood of human beings is obtained with doses of sulphathiazole of 4–6 g. per day.—J. M. Robson.

Bazeley, P. L. (1940). **The Nasopharyngeal Method of Administering Drugs, with Special Reference to Sulphanilamide.**—*Aust. vet. J.* **16.** 27–30. 2 figs.

The slight solubility of sulphanilamide in water at normal temperatures (0·6%) is such that intravenous administration is impracticable and subcutaneous injection apt to be followed by a sterile abscess at the site. Administration to horses by means of a nasopharyngeal tube has proved easy and effective. A glass jar graduated in ten equal divisions and holding 1 litre of liquid is an ideal container. The dose is delivered as a suspension under pressure from an enema syringe attached to the jar. By this means 1 litre of liquid can be passed down the tube in less than 30 sec. without marked discomfort to the horse. The advantages claimed over other methods of oral administration are absence of waste which usually follows ordinary drenching and more rapid absorption of the drug than when a ball or capsule is used. —H. B. Carter.

Vacirca, F. (1939). Recherches systématiques concernant l'action de la para-amino-phényl-sulfonamide et de ses dérivés sur le cours et l'évolution de l'infection streptococcique expérimentale chez le lapin. [**Research Regarding the Action of Para-Amino-Phenyl-Sulphonamide and its Derivatives on Experimental Streptococcus Infection in Rabbits**].—*Boll. Sez. ital. Soc. int. Microbiol.* **11.** 16–19. [In French].

V. studied the effect of this drug and some of its derivatives in healthy rabbits. A dose of 0·5 g. per kilo of *p*-aminophenylsulphamide is tolerated by adult healthy rabbits weighing between 2–3 kg. without their showing any clinical symptoms ; it can be given repeatedly at intervals of several days. The same applies to the glucoside of phenyl-sulphonamide. The disulphamide and the dimethylsulphamide may be given in doses of 1 g. per kg. *p*-Amino-phenyl-sulphonamide-formaldehyde-sodium-bisulphite may be administered intravenously, subcutaneously, or intramuscularly in doses of 1 g. per kg. The drugs were also tolerated by rabbits affected with experimental nephritis, hypocalcaemia, and hyperthyroidism.

The effects of these drugs were also studied in rabbits which had been infected with virulent haemolytic streptococci. *p*-Amino-phenylsulphonamide and several of its derivatives considerably modified the course of the infection causing the disappearance of the organisms

from the circulating blood and the survival of the treated animals. Better results were obtained when the rabbits were treated before infection or shortly after they had been inoculated with the streptococci. The drugs were effective in the following decreasing order, phenyl - sulphamide - formaldehyde - sodium - bisulphite, disulphamide, dimethyldisulphamide, phenyl-sulphamide glucoside, glycin-sulphamide, and disulphamide-formaldehyde-sodium-bisulphite.—D. L. HUGHES.

KING, J. T., HENSCHEL, A. F., & GREEN, Beryl S. (1939). **The Bacteriostatic and Antitoxic Actions of Sulfanilamide. Tissue Culture Studies.**—*J. Amer. med. Ass.* **113.** 1704–1709. 5 figs., 4 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

A tissue culture study has been made of the bacteriostatic and antihemolytic properties of sulfanilamide. All strains of *beta* streptococci studied were inhibited. The bacteriostatic effect varied directly with the concentration of the drug and inversely with the number of bacterial colonies. Reduction in hemolysis was observed to accompany bacteriostasis. Correlation of the reduction in hemolysis with the observed bacteriostasis leads to the conclusion that the antihemolytic effect is secondary to bacteriostasis. The drug regularly inhibits the wide, diffuse peripheries usually seen around colonies of *beta* streptococci growing in clots of tissue culture. The drug causes the development of abnormal, long chains of streptococci.

BAYLISS, M. (1940). **Effect of Sulfanilamide, Sulfapyridine, and Sulfathiazole on Staphylococcus Toxins.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 525–529. 4 tables. [9 refs.]

The lethal action of staphylococcus toxin in mice is not inhibited by sulphanilamide, sulphapyridine, or sulphathiazole. There was no neutralization of the dermo-necrotic toxin (in g. pigs) or of enterotoxin (in kittens); α- and β-haemolysins were slightly diminished in activity at concentrations approaching the saturation point of the sulphonamides, but were unaffected at concentrations of less than 0·01%.—J. M. ROBSON.

MORALES-OTERO, P., & GONZÁLEZ, L. M. (1940). **Effect of Azosulfamide (Neoprontosil) on Experimental *Welchii* Infection in Mice.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 532–534. 1 table. [7 refs.]

Mice inoculated with M.L.D. of *Clostridium welchii* were not protected by intramuscular injection of neoprontosil. The intramuscular injection of washed cells of *Cl. welchii* together with neoprontosil in mice led to the development of a fatal infection.—J. M. ROBSON.

RILEY, J. F. (1940). **Sulphydryl Compounds and Wound Repair.**—*Brit. med. J.* Oct. 19th. 516–519. [Numerous refs.]

Migration of cells alone is sufficient for the healing of small wounds, but larger wounds require the additional function of growth by mitosis. There is much evidence that compounds of the sulphydryl (–SH) group tend to stimulate mitosis. Preliminary experiments in rabbits showed that cysteine hydrochloride gave some acceleration of healing in large excised wounds. Clinically cysteine hydrochloride hastened healing of wounds produced by deep X-ray or radium therapy. No details of experiments or cases are given.—J. M. ROBSON.

MCKINLEY, E. B., MECK, Jean S., & ACREE, Ellen G. (1939). **Chemotherapy in Virus Diseases.**—*J. infect. Dis.* **64.** 36–42. 4 tables. [14 refs.]

Treatment with sulphanilamide, prontosil and sodium sulphanilyl sulphanilate was found to be of no therapeutic value in experimental infections with the viruses of rabbit myxoma, rabbit fibroma, herpetic encephalitis, choriomeningitis and St. Louis encephelitis.

—J. M. ROBSON.

SCHULTZ, M. P., & ROSE, Edythe J. (1939). **The Evolution of Disseminated Bacterial Infection in Guinea Pigs. Influence of Treatment with Insulin and Phloridzin.**—*Publ. Hlth Rep., Wash.* **54.** 657–662. 2 tables. [4 refs.] [Authors' conclusions copied *verbatim*].

In guinea pigs with group C *Hemolytic streptococcus* subcutaneous abscesses, treatment with phloridzin promotes dissemination of the infection through the blood stream while treatment with insulin apparently favors continued localization of the infection.

WARRINGTON YORKE. (1940). **Recent Work on the Chemotherapy of Protozoal Infections.**—*Trans. R. Soc. trop. Med. Hyg.* **33.** 463–476. 2 tables. [Numerous refs.] Discussion pp. 476–482.

A brief review is given of work on the trypanocidal action of synthalin, which the author concluded did not depend on any hypoglycaemia which it may produce but on its

direct lethal effect on trypanosomes; and the discovery of the activity of N-undecane-1 : 11-diamidine is referred to. This discovery was followed by an investigation of a series of aromatic compounds containing the amidine group which were divided into four groups, *viz*, compounds linked by a straight -C-linkage, compounds linked by an -O-linkage, those linked by an -N-linkage and those linked by an -S-linkage. Whilst most of the compounds in the first three groups exhibited trypanocidal activity, those in the fourth group were inactive.

The most active compounds were found to be 4 : 4′-diamidino stilbene, 4 : 4′ diamidino diphenoxy propane and 4 : 4′ diamidino diphenoxy pentane [see *V. B.* **11.** 58]. The most active of these compounds is diamidino stilbene of which 0·005–0·00625 mg. given to a 20 g. mouse clears the peripheral blood of *T. rhodesiense* in more than 50% of cases, although a 20 g. mouse will tolerate a dose of 1 mg. given intraperitoneally. Doses of 0·025 and 0·05 mg. cause a permanent cure of the great majority of animals treated.

In compounds of the series R-O(CH_2)n O-R where R represents the radicle

the trypanocidal activity increases with the length of the alkane chain up to a point when n = 5, and it was also noted that the activity of the 4 : 4′ diamidine compounds was distinctly greater than the 3 : 4′ or 3 : 3′ compounds, whilst relatively slight changes in the radicle

completely destroyed trypanocidal activity.

4 : 4′-diamidino stilbene was found to cure *T. congolense* infection in mice, *Leishmania donovani* infection in hamsters and *Babesia canis* infection in dogs. It had a definite therapeutic action on malarial infections of man, monkeys and canaries, but failed to exert any action on certain spirochaetal infections or on *T. cruzi* infection in mice. For *T. congolense* infection in mice cures were obtained with a single dose of 1 mg. or three doses of 0·25 mg. given on consecutive days.

This drug has given hopeful results in a few cases in which it has been used for the treatment of human leishmaniasis, and it is also under trial in the treatment of human sleeping sickness.

In the discussion which followed, HAWKING reported that it had been shown that diamidino stilbene is absorbed by living trypanosomes as it gives a brilliant blue fluorescence in ultraviolet light, and can be detected under the fluorescent microscope in motile trypanosomes in thin blood films made from infected mice treated one hour before the taking of the specimen.—U. F. RICHARDSON.

GUYAUX, R. J. (1940). Le Surfen C dans le traitement de la trypanosomiase bovine à Trypanosoma congolense. **[Treatment of *T. congolense* Infection in Cattle with "Surfen C"].**—*Ann. Soc. belge Méd. trop.* **20.** 61–67. 4 tables. [8 refs.]

Following infection with a very virulent strain of *T. congolense*, 28 cattle were treated by the intramuscular injection of "Surfen C" at a dose of 2·5 g. given as a 1 : 40 solution in water. Sixteen of the animals, many of which were kept under observation up to two years, appeared to be entirely free from infection, but 12 animals showed trypanosomes in the blood in periods varying from 3–8 months after treatment. G. considers that this reappearance of trypanosomes was due to reinfection and not to relapse in the majority of cases, and claims that 82% of the animals were cured by a single injection of "Surfen C". He compares this with the treatment of 292 infected cattle with tartar emetic with the cure of only 43%. [The results of treatment with both "Surfen C" and tartar emetic appear to vary in different areas.] —U. F. RICHARDSON.

GAPUZ, R. B. (1940). **Derris Infusion as a Poultry Dip for Louse Eradication.**—*Philipp. J. anim. Indust.* **7.** 153–162. 2 figs. on 2 plates, 4 tables. [3 refs.]

G. reports certain observations on the control of chicken lice by derris infusion dips. A 1% or stronger infusion is recommended. Instructions are given for preparing infusions from fresh or dried derris roots.—S. G. IYER.

SWANSON, L. E., PORTER, D. A., & CONNELLY, J. W. (1940). **Efficacy of Nonconditioned Phenothiazine in Removing Worms from the Alimentary Canal of Cattle.**—*J. Amer. vet. med. Ass.* **96.** 704–707. 2 tables. [10 refs.]

Six calves in poor condition, obtained from herds where losses due to parasitic gastroenteritis had occurred, were dosed with unconditioned phenothiazine (*i.e.* without a wetting agent) after 24 hours' fasting. The

doses, varying from 0·44–1·1 g. per kg. body weight (50–80 g. per animal), were given in gelatin capsules. Control calves were kept. Faeces were collected and examined for worms for 6–8 days after treatment; the calves were then killed, autopsied, and the remaining worms classified and counted.

The efficacy of the drug was found to be almost 100% against *Haemonchus contortus*, *Ostertagia ostertagi*, *Trichostrongylus axei*, and *Oesophagostomum radiatum*. A similar result against *Bunostomum phlebotomum* was obtained only in cases where the dose rate was above 0·66 g. per kg. of body weight. Immature worms were not eliminated, and the authors suggest that a second dosing may be desirable. The drug was virtually unsuccessful against *Cooperia* spp., *Trichuris* sp., *Strongyloides papillosus*, and *Moniezia* sp.

Owing to the light and bulky nature of the drug, administration by capsule was difficult. It was found to be comparatively non-toxic.

—K. Sanderson.

McCulloch, E. C., & Nicholson, L. G. (1940). **Phenothiazine for the Removal of Heterakis Gallinae from Chickens.**—*Vet. Med.* **35.** 398–400. 1 fig., 2 tables. [8 refs.]

In tests carried out by the authors, phenothiazine was found to be efficacious against *H. gallinae*. They treated 26 birds, and in 22 of these 100% of the caecal worms were killed and expelled.

The doses used ranged from 0·05–0·5 g., repeated doses being slightly more successful than single doses, and individual dosing by capsule more successful than general medication in the food. No toxicity resulted from even large doses of phenothiazine, so that dosing in the food is a practical method of administration. Egg laying and the flavour of the meat remain unaffected by the drug.

[The particular efficacy of phenothiazine against worms of the large intestine, *e.g.* strongyles in horses, oesophagostomes in sheep, and *Enterobius* in man is emphasized.]—K. S.

Harwood, P. D., & Guthrie, J. E. (1940). **Tests with Miscellaneous Substances for the Removal of Tapeworms from Chickens.**—*J. Amer. vet. med. Ass.* **97.** 248–253. [Numerous refs.] [Authors' summary copied *verbatim*].

Of the 223 substances and 27 mixtures tested experimentally as anthelmintics for the removal of tapeworms from chickens, only lead arsenate exhibited any promise as a poultry taeniacide.

In carefully controlled tests in which chickens experimentally infected with *Raillietina cesticillus* were used, it was found that lead arsenate in effective doses is too toxic to be recommended for general use as a poultry taeniacide.

Jones, L. M., & Hewitt, E. A. (1940). **Effects of the Intravenous Injection of Certain Salts of Sodium, Calcium and Potassium on Intestinal Tonus and Motility in the Dog.**—*J. Amer. vet. med. Ass.* **96.** 359–364. [10 refs.]

The action of various saline purgatives was studied on anaesthetized and unanaesthetized dogs. In both cases as well as the respiratory and circulatory movements, intestinal motility was recorded, a new technique, which is described, being used in the case of the unanaesthetized animals.

Sodium ions appear to stimulate the intestinal muscle, whereas citrate and chloride ions do not. A 5% solution of sodium bicarbonate produced stronger and more prolonged intestinal movements than any other solution tested. Doses up to 600 c.c. of a 5% solution produced no effect on the respiratory or circulatory systems. Potassium chloride and bicarbonate depressed intestinal movement, the former being in addition exceedingly toxic to the heart.

—J. A. Nicholson.

Craige, A. H., Jr. (1939). **The Relationship Between Salivary Output and Intestinal Effects with Carbaminoylcholine Chloride (Lentin).**—*J. Amer. vet. med. Ass.* **95.** 701–709. 3 figs., 5 tables. [8 refs.]

C. studied the response of unanaesthetized dogs prepared with salivary and intestinal fistulae to the subcutaneous injection of increasing doses of carbaminoylcholine chloride (Lentin). It was found that 0·001 mg. per kg. was hardly sufficient to produce an increase of parotid or intestinal secretion, whereas 0·004 mg. per kg. produced a definite response of both secretions, and 0·012 mg. per kg. a maximal one. Intestinal motility was increased by 0·004 mg. per kg. but doses three times greater did not produce a greater response. C. concludes that the total output and duration of salivation varies directly with the dose and the salivary and intestinal secretions so induced run parallel; thus by observing the salivary secretion the clinician can judge what the intestinal response has been.—J. A. Nicholson.

POISONS AND POISONING

McCulloch, E. C., & Murer, H. K. (1939). **Sodium Chlorate Poisoning.**—*J. Amer. vet. med. Ass.* **95.** 675–682. [10 refs.]

Some 14 dosing experiments upon young chickens varying in weight from 152–237 g. indicated that the lethal dose of sodium chlorate was rather more than 5 mg. per g. body weight. A methaemoglobinaemia followed dosage in every case. In an unspecified but limited number of observations on sheep, a dose of 90 g. (2·06 g. per kg. was not fatal, whereas one of 120 g. (2·5 g. per kg.) produced stupor and death within seven hours. Methaemoglobinaemia was produced by doses of 10 g. and over. In fatal ovine cases the flesh and blood were darkened, and there were black eroded areas on the lining of the abomasum and of the first 10–12 in. of duodenum.

The effect of the administration of reducing agents and the alkalinization of the digestive tract was tried on affected animals. Oral administration of cerelose (maize sugar) or sodium thiosulphate, or the intravenous injection of sodium thiosulphate, calcium gluconate, or sodium galacturonate did not appear to exert any beneficial influence. Copious doses of sodium carbonate solution two hours after administration of a fatal dose of $NaClO_3$ to a sheep were without effect.

Areas of a heavy growth of bindweed were sprayed with $NaClO_3$ at the rate of 5 lb. per sq. rod. A sheep was confined for 11 days in these areas by tethering, and allowed no other food; it ingested the bindweed readily but remained normal; no methaemoglobinaemia was detected in samples of blood which were drawn daily.

Three apparent outbreaks of $NaClO_3$ poisoning in Washington are described, and in each of them the sprayed weed was Canada thistle. In the first, in which abortion and death occurred in cattle, the application of the sodium chlorate had been excessive, partially used drums of the substance had not been removed from the site, and actual lumps of the salt were to be found on the pasture. Cattle and sheep respectively were affected in the other two outbreaks, in both of which the grazing following the treatment was excessive, indicating increased palatability of the forage as a result of the chlorate or an effort to get more chlorate possibly due to a lack of salts in the diet. Despite these cases, it is suggested that if the $NaClO_3$ treatment of weeds be carried out with proper precautions, no harm should follow to grazing animals.—A. N. W.

Graham, R., Sampson, J., & Hester, H. R. (1940). **Results of Feeding Zinc to Pregnant Mares and to Mares Nursing Foals.**—*J. Amer. vet. med. Ass.* **97.** 41–47. 5 figs., 1 table. [8 refs.]

In 1937 an obscure disorder in two suckling colts, associated with arthritis and abnormal quantities of zinc in bones and liver, although also with parasitism, was suspected by the local veterinarian as having been caused by zinc contamination of pastures from a zinc smelt in the vicinity of the farm. The experiments in this paper entirely negatived that hypothesis and showed that large quantities of zinc could be fed to pregnant and nursing mares for long periods without effect either on foal or mother. Four of the mares were given 3·5 g. of zinc lactate daily in their grain rations for varying periods up to about a year, and two were given as much as 35 g. daily for 390 days and 412 days respectively. Most of the zinc was excreted in the faeces, relatively little in the urine, and hardly any in the milk.

It is suggested that the arthritis of the original colt disease was of bacterial origin although invaders were not actually found in the terminal stages.—H. H. Green.

Fairhall, L. T., & Sayers, R. R. (1940). **The Relative Toxicity of Lead and Some of Its Common Compounds.**—*Publ. Hlth Bull.* No. 253. pp. 40. 14 figs., 12 tables. [Numerous refs.] Washington, D.C.: U.S. Public Health Service.

The investigation comprised studies on more than 500 g. pigs, following administration of the commoner industrial lead compounds by mouth, by intraperitoneal injection, and by inhalation. Body weight changes and mortality figures were recorded and symptoms of poisoning noted, particularly in respect of muscular incoordination and blood changes such as basophilic stippling and polychromasia. Chemical analyses were made to ascertain the degree of absorption of lead and to trace distribution over the tissues.

The toxic effect of lead was more evident on inhalation than when administered orally or intraperitoneally, a point of great importance to industries employing lead compounds. The order of toxicity in feeding experiments did not

vary widely for the relatively insoluble compounds tested, although the most toxic were the carbonate, the monoxide, and the sulphate. Lead arsenate proved to be exceedingly toxic by intraperitoneal injection, but the effects were largely due to the arsenic, other lead compounds of similar solubility being only slowly absorbed.

From the pathological point of view, particles in peritoneal tissue indicated that the compounds were slowly absorbed, but that during the process the nodules formed had the appearance of those produced by inert mineral dusts. The fatty metamorphosis found in the liver in cases of lead poisoning appeared to be the result of toxic action of lead on the cells rather than the result of circulatory disturbances. The observed splenic haemosiderosis appeared to be a fair index of relative toxicity and of destruction of blood cells. Acute diffuse pneumonitis was frequent in animals exposed to inhalation. Subacute interstitial nephritis appeared with sufficient frequency to be interpreted as low-grade damage caused by the action of lead on the kidneys.—H. H. GREEN.

McCULLOCH, E. C., & ST. JOHN, J. L. (1940). **Lead-Arsenate Poisoning of Sheep and Cattle.**—*J. Amer. vet. med. Ass.* **96.** 321–326. 1 fig. [Numerous refs.]

In a flock of 1,000 sheep turned into bush herbage under sprayed apple trees after transfer from summer range 60 deaths occurred within three days and a further 621 in the course of the ensuing week. Of 80 hungry steers unloaded from trucks into an apple and pear orchard, 17 died within two days and a further six over the following week, P.M. examination showing that they had engorged upon sprayed leaves. A few family cows grazed simultaneously on strips of alfalfa in the same orchard with no ill-effects.

Symptoms and rate of death corresponded to acute arsenical poisoning and analysis of ruminal contents of both cattle and sheep showed large quantities of arsenic and lead even when death was delayed. The very large amounts found by analysis, as compared with the small amounts of arsenic generally regarded as fatal, suggested that changes take place in lead arsenate after atmospheric exposure on sprayed leaves and vegetation, whereby its toxicity is reduced.

Actual experiments on feeding lead arsenate mixed with barley showed that sheep receiving 1–2 g. daily succumb within a few days, but that quantities of the order of 0·25 g. can be tolerated for long periods. One sheep on this low daily dose developed chronic poisoning after 18 days and died in a cachectic state after 35 days, showing a " lead line " on the gums and a darkening of the marrow of the flat bones. Another, however, was put out of experiment after 94 days without having shown symptoms after total consumption of 23·5 g.

The black marrow of sheep fed for considerable periods on lead arsenate suggested that chronic poisoning with this compound may be the cause of a condition locally known as " black cutters ".

A useful relevant bibliography is given.

—H. H. GREEN.

DE LAY, P. D. (1940). **Grasshopper-Poison Bait and Turkey-Poult Mortality.**—*J. Amer. vet. med. Ass.* **97.** 149–150. 2 tables. [6 refs.] [Author's summary copied *verbatim*].

Mortality in turkey poults following exposure to a range upon which improperly spread grasshopper bait [sodium arsenite] was used is reported. Poults of the same age confined and fed a mixture similar to that reported as used in the field died within twelve hours after exposure.

BIESTER, H. E., SCHWARTE, L. H., & REDDY, C. H. (1940). **Further Studies on Moldy Corn Poisoning (Leucoencephalomalacia) in Horses.**—*Vet. Med.* **35.** 636–639. 7 figs. [2 refs.]

Experiments reported in this paper failed to determine which of the numerous organisms present on mouldy maize was responsible for the toxin causing leucoencephalomalacia. One horse, fed the maize on which a green mould was present, died after 40 days and showed the characteristic liquefactive necrosis in the brain. A second horse killed after consuming the same material for 110 days showed marked microscopic changes in the central nervous system but no gross liquefaction in the brain. Similar variations in individual susceptibility were found in a previous feeding experiment. Three horses fed maize with a grey mould growth were killed after a feeding period of 110 days. P.M. the microscopic changes consisted of perivascular oedema, retrograde changes in the blood vessel walls, minute foci of coagulation, and haemorrhages in the brain.—N. J. S.

BRADLEY, W. B., EPPSON, H. F., & BEATH, O. A. (1940). **Methylene Blue as an Antidote for Poisoning by Oat Hay and Other**

Plants Containing Nitrates.—*J. Amer. vet. med. Ass.* **96.** 41–42. 1 table. [7 refs.]

Experiments are reported in which 2 g. methylene blue injected intravenously as a 4% solution protected cattle against lethal doses (up to 350 g.) of KNO_3. The authors conclude that a similar dose of methylene blue is sufficient to protect an animal weighing up to 250 kg. against the ingestion of 6·3 kg. of plant material containing about 5% KNO_3.

—N. J. SCORGIE.

McCULLOCH, E. C. (1940). **Hepatic Cirrhosis of Horses, Swine, and Cattle Due to the Ingestion of Seeds of the Tarweed, Amsinckia Intermedia.**—*J. Amer. vet. med. Ass.* **96.** 5–18. 11 figs. [18 refs.]

Feeding trials carried out by the author have demonstrated that the seeds of *A. intermedia* are responsible for enzootic hepatic cirrhosis, known as walking disease of horses, and for hard liver disease of swine and cattle, as it occurs in certain regions of the Pacific north-west of the U.S.A. Symptomatology and pathology are described, the latter only briefly. Rabbits, rats, and chickens appeared to be immune, and sheep were either immune or highly resistant.

The data indicate that a considerable amount of the seed must be fed before pathological changes are produced. The history of natural outbreaks of the disease indicates that the seeds vary in toxicity during certain years, and there is also the possibility that the seeds of this plant, grown in other regions with different soil and climatic conditions, may be less toxic, *e.g.* the seeds were suspected of causing disease of sheep in Australia but tests showed that they were non-toxic.

The exceedingly irritant nature of the standing plant makes it appear improbable that the plant would be eaten by livestock. The seeds, however, after passing through the threshing machine in the process of threshing wheat, are not irritant and possess a pleasant nut-like flavour. Alcoholic extracts of the seed contain the toxic principle of *A. intermedia*, and further studies are being made to ascertain its chemical nature.—N. J. SCORGIE.

MATHEWS, F. P. (1940). **The Toxicity of Red-Stemmed Peavine (= Astragalus Emoryanus) for Cattle, Sheep and Goats.**—*J. Amer. vet. med. Ass.* **97.** 125–134. 1 fig., 4 tables. [6 refs.] [Author's summary copied *verbatim*].

Sheep and cattle losses due to the grazing of red-stemmed peavine (= *Astragalus emoryanus*) are described.

The plant was proved to be toxic for cattle, sheep and goats, the young plant being more toxic than the older or more mature plant.

The characteristic symptoms were muscular incoördination and loss of weight with slow and doubtful recovery. In sheep difficult respiration also was observed.

The plant was collected from three limestone areas and found to be toxic in all cases; that collected near Apine from soil of igneous origin produced no toxic effects when fed to goats.

The toxic principle was destroyed by drying the plant for four months.

McLENNAN, G. C. (1938). **Poisoning of Sheep by *Helichrysum blandowskianum* Steetz (Woolly Everlasting).**—*Aust. vet. J.* **14.** 241–244. 1 fig.

Losses among sheep in South Australia have been attributed to this plant from time to time. Experiments indicated that the toxic substance in the plant was more readily extracted with alcohol than ether or water. The symptoms following drenching with a mixed extract included slow laboured respiration with grunting on expiration, weakness of limbs, and total blindness. Similar symptoms followed drenching with an alcoholic extract but with the addition of twitching and struggling and with death within five hours.

Lesions may include congestion of the liver and kidneys, excess pericardial fluid and straw-coloured peritoneal fluid, with extensive sub-endocardial haemorrhage in both ventricles, especially in the right, and haemorrhage from the diaphragmatic vessels near the costal margin.

Microscopic changes in the kidney include dilatation of the capsular space round the glomeruli, dilated urinary tubules, and cloudy swelling of the epithelial lining. Sections of diaphragm show marked extravasation of blood between the muscle bundles.—H. B. CARTER.

WILLIAMS, C. H., & HINES, H. J. G. (1940). **The Toxic Properties of *Salvia reflexa*.**—*Aust. vet. J.* **16.** 14–20. [12 refs.]

S. reflexa, commonly called wild mint, or mint weed, is well known in Queensland and New South Wales as a plant poisonous to stock, and it has caused heavy mortality in the field. It contains up to 5% potassium nitrate on a dry matter basis. The water extract of 2 lb.

of the plant can cause death due to methaemoglobinaemia, the characteristics of which are discussed. The nitrate in the plant is converted to the nitrite through the action of either plant or animal enzymes. The toxic action is therefore essentially due to the conversion of haemoglobin to methaemoglobin by the nitrites thus produced. Nitrate accumulation in plants in amounts sufficient to be toxic is most likely in the drier parts of Queensland, following the spring and early summer rains.—H. B. CARTER.

DE WAAL, H. L. (1940). **South African Senecio Alkaloids. [Correspondence].** —*Nature, Lond.* **146.** 777–778. [3 refs.]

Besides the alkaloid retrorsine, the alkaloid isatidine and a new alkaloid of probable empirical formula $C_{18}H_{25}O_8N$, were isolated from *Senecio retrorsus*. From *S. rosmarinifolius* a new alkaloid rosmarinine, which on hydrolysis yielded senecic acid and a new base rosmarinecine, was isolated. In *S. pterophorus* was found a new alkaloid pterophine, as well as retrorsine. The species *S. ilicifolius*, responsible for "bread poisoning" in human beings in Cape Province contains three toxic alkaloids, *viz*, senecionine, pterophine, and retrorsine. The chemistry of all the products mentioned is briefly discussed.—H. H. GREEN.

PHYSIOLOGY

SOBEL, A. E., YUSKA, H., PETERS, D. D., & KRAMER, B. (1940). **The Biochemical Behaviour of Lead. I. Influence of Calcium, Phosphorus, and Vitamin D on Lead in Blood and Bone.**—*J. biol. Chem.* **132.** 239–265. 9 tables. [Numerous refs.]

Experiments on young rats on diets containing a constant amount of lead carbonate but varying amounts of Ca, P, and vitamin D, led to the conclusion that Pb, P, and vitamin D form a system of lead deposition in bone analagous to the recognized system of skeletal calcification. The two systems are governed by the same laws but are independent, so that increased deposition of Ca in bone does not necessarily mean increased deposition of Pb. Indeed, simultaneous removal of calcium phosphate and deposition of lead phosphate is possible.

Increased dietary Ca reduces deposition of Pb by competing for the P available to both. The influence of vitamin D on blood Pb is similar to its influence on blood Ca. Variations in level of blood Pb are explained by assuming a relationship with ratio of dietary Pb and P, similar to the known relationship between blood Ca and ratio of dietary Ca and P. The Pb in the blood is mainly present in the corpuscles, in distinction to Ca which is almost wholly in the plasma.

[It may be recalled that the generally accepted earlier view presumed co-precipitation of phosphates of Pb and Ca, *i.e.* assumed that when Ca was being deposited in bone any circulating lead was simply deposited with it, and that when decalcification occurred stored lead was also liberated.]—H. H. GREEN.

SJÖBERG, K. (1939). Veranderungen im Gehalt des Bluts an Phosphorverbindungen, Phosphatase und Cholesterin in Zusammenhang mit dem Partus beim Rinde. **[Changes in the Phosphorus-Compound, Phosphatase and Cholesterin Content of the Blood of Cattle at Parturition].**—*Skand. Arch. Physiol.* **81.** 51–64. 2 tables. [Numerous refs.]

Data on chemical composition of blood are recorded for six cows before and after calving in respect of inorganic P, ester P, lipoid P, cholesterin, and phosphatase. At parturition inorganic P fell sharply, even to one-third of the normal value, both in plasma and corpuscles, the minimum value in the latter occurring 1–2 days later than in the former. Normal values were regained in the course of a few days. Ester P in the corpuscles showed a trend in the same direction as inorganic P. Lipoid P and cholesterol fell distinctly a few days after parturition, remained low for 2–3 weeks and then returned to normal. The ratio of cholesterol to lecithin showed no marked change. Serum phosphatase values were little altered, if anything sinking somewhat at parturition.

—H. H. GREEN.

SAMPSON, J., & BOLEY, L. E. (1940). **Studies on the Total Ketone Bodies, Sugar and Calcium of the Blood of Nonpregnant, Nonlactating Ewes.**—*J. Amer. vet. med. Ass.* **96.** 480–485. 2 figs., 2 tables. [13 refs.]

Analyses of blood samples taken at different times during the day for four consecutive days from a group of five non-pregnant, non-lactating ewes showed that there was no appreciable diurnal variation in the total ketone

bodies, sugar or calcium of the blood. On the other hand, vigorous exercise for 15 min. greatly increased the blood sugar content and moderate exercise produced a slight but definite increase. In both cases the blood calcium level remained unaltered. Fasting for seven days produced a definite drop in blood sugar and a definite increase in the total ketone bodies, but no change in the blood calcium level was noted.—J. A. NICHOLSON.

EDEN, A., & GREEN, H. H. (1940). **Seasonal Ketonaemia in a Dairy Herd, without Clinical Symptoms.**—*Vet. Rec.* **52.** 725–728. 1 table. [8 refs.]

Analyses of blood taken from a dairy herd of 60 healthy cows at different periods between June and the following March showed that wide variations in ketone values occurred during the summer and winter when the animals were in the stall. Summer average was 3·0 mg.% and winter average 8·1 mg.% with 7% of the herd over 15 mg.% and one cow as high as 45 mg.%. No evidence of hypoglycaemia or acidosis was obtained.

It is pointed out that a rise of blood ketone is only one symptom of the disease usually called "acetonaemia" and that the ketone bodies themselves are not responsible for producing the clinical symptoms since they are not toxic even at ten times their normal level. —J. A. NICHOLSON.

PAYNE, F. (1940). **'Signet Ring' or 'Castration' Cells in the Chick.**—*Anat. Rec.* **76.** 29–37. 15 figs. on 1 plate. [9 refs.]

Characteristic "signet ring" cells have been described in the pituitary of rats and other mammals by several workers. They are probably modified basophile cells and have been considered by some to indicate accumulation of gonadotrophic hormone. P. has found these cells in young normal chicks of both sexes, but not in castrated birds. No explanation which completely fits the facts can be given of their function.—E. G. WHITE.

SIMMS, B. T. (1940). **Erythrocyte Sedimentation Studies in Dogs.**—*J. Amer. vet. med. Ass.* **96.** 77–80. 1 table. [4 refs.]

Sedimentation rates of 20 blood samples (citrated) from 15 apparently normal dogs were found to be from 1–4 mm. in one hour. The sedimentation rate from 20 different blood samples for eight apparently healthy pregnant bitches varied from 1–52 mm. in one hour, the mean being 15·4 mm. The rate tended to increase as pregnancy advanced, and S. suggests that an increased rate in a normal healthy mated bitch may be considered as presumptive evidence of pregnancy. Dogs affected with canine distemper had sedimentation rates of 7–50 mm. (mean 26 mm.) which were much higher than the apparent normal. A similar increase was recorded in dogs with salmon poisoning.—N. J. SCORGIE.

RIMINGTON, C., & VAN DEN ENDE, M. (1940). **Comparison of the Globoglycoid, Crystalbumin, Seroglycoid, and Seromucoid Fractions of Normal Horse Serum.**—*Biochem. J.* **34.** 941–958. 7 text-figs., 2 figs. on 1 plate, 4 tables. [Num. refs.]

The authors describe their methods of preparing globoglycoid, crystalbumin, seroglycoid, and seromucoid from horse serum.

They conclude that the test based on anaphylaxis will detect the presence in normal serum of at least five protein antigens, *viz*, euglobulin, pseudoglobulin, crystalbumin (existing also in the form of globoglycoid), a glycoprotein in "seroglycoid" and another in "seromucoid". The carbohydrate complex found in crude crystalline serum albumin is regarded as being associated with other protein constituents than the crystalbumin itself, which when rigidly purified contains no carbohydrate. They consider that globoglycoid is not a globulin in any sense except in its precipitation by $(NH_4)_2SO_4$ at neutral reaction, being completely crystallizable and interconvertible with crystalbumin by appropriate methods and similarly free from carbohydrate when pure.

Immunological evidence is provided which suggests that seroglycoid preparations contain a carbohydrate antigen which is distinct from crystalbumin.

Seroglycoid and seromucoid, although both rich in bound carbohydrate, differ from one another when compared by anaphylactic methods.—H. V. HUGHES.

BREMER, J. L. (1940). **The Pneumatization of the Humerus in Common Fowl and the Associated Activity of Theelin.**—*Anat. Rec.* **77.** 197–211. 6 figs. on 2 plates. [Numerous refs.] [Author's summary copied *verbatim*].

The humerus of the chick is invaded by an extension of the cervical air sac, itself an outgrowth of the lung. The sac reaches the bone only after the cortex is well formed,

About 2 weeks after hatching the cortex at several points below the epiphyseal line undergoes changes similar to those characterizing the disease osteitis fibrosa in mammals, with dissolution of trabeculae and invasion by mesenchymal tissue. The invasion spreads along one of the veins to the marrow cavity and extends to the marrow trabeculae. Through this mesenchymal pathway the air sac grows as a tubular process, branching along the trabeculae, destroying the marrow, and finally by anastomosis of the branches occupying the entire cavity.

Osteitis fibrosa is well known to be caused by hyperactivity of the parathyroid glands. A later stage of the disease, with deposition instead of dissolution of bone, has been seen to follow prolonged treatment with estrogens. The present experiments show that the earlier stage may also be produced by estrogens. It is suggested that the estrogens taken into the chick by the retraction of the yolk sac before hatching act either directly or indirectly on the parathyroid glands to produce a temporary condition of osteitis fibrosa, thus affording a mesenchymal pathway for the air sac with resulting pneumatization of the bones.

NORÉN, S. (1939). Bidrag till kännedomen om lymfbanorna från Spatium retromucosum i trakean hos nötkreatur. **[The Lymphatic Vessels for the Retromucosal Space of the Trachea of Cattle].** —*Skand. VetTidskr.* **29.** 781–787. [6 refs.]

By observations on the carcasses of 13 calves injected with a dye into the retromucosal space of the trachea, 12 being injected P.M. and one before death, it was noted that the lymphatic drainage went mainly to the right side, to the right cranial mediastinal, costo-cervical, caudal cervical, and middle cervical lymph nodes, though a few vessels went to the left.—J. E.

GRAY, J. H. (1940). **Studies of the Regeneration of Lymphatic Vessels.**—*J. Anat.* **74.** 309–335. 15 text-figs., 16 figs. on 3 plates. [Numerous refs.] [Author's conclusions copied *verbatim*].

The work refers solely to adult mammalian lymphatic vessel regenerative phenomena. Human tissue subjected to pathological influences and to special surgical procedures has been examined. Experiments on lymphatics in tubed pedicles in rabbits and in rabbits' ears have been carried out.

Peculiar properties of lymphatic trunks.—Thrombosis does not ordinarily follow trauma to trunks. A flow of lymph is not necessary to the continued existence of a trunk in the body. Tears or cuts in a trunk may remain open if the flow in the vessel is quite unrestricted. Tears or cuts in trunks do ordinarily become sealed up, and this may be associated with some damming up of the lymph flow. Transplantation of a trunk does not prevent its being used subsequently in the lymphatic circulation.

The initial regenerative growth of lymphatics in the adult.—Such growth may occur from both capillaries and trunks. The method is by sprouts in both cases, and the sprouts may succeed in uniting trunk with trunk. The stimuli adequate to produce this growth may be cutting alone, altered pressure-flow conditions within the vessels alone, or a combination of these. Hypertrophy of dermal papillae is another adequate stimulus, but this has not been further analysed. Transplantation of trunks impairs their sprouting capacity. The total growth in length of sprouts as such is limited in life to 1–2 mm. by fibrous scar tissue or by union with other vessels.

Subsequent elaboration and modelling of lymphatic vessels.—Remodelling and elaboration of pre-existing small vessels into large definite trunks occur in response to altered conditions of pressure and flow of lymph. These changes are very seriously hampered by fibrous connective tissue. Modelling and elaboration of newly formed lymphatic vessels occurs, but is in practice usually much slower, and also is much interfered with by scar tissue. The rate of these processes is to be measured in terms of weeks.

MEYER, R. K., & WOLFE, H. R. (1939). **Gonadotropic Inhibitory Substance and Precipitins in the Blood of Monkeys Receiving Gonadotropic Hormone Preparations.**—*J. Immunol.* **37.** 91–102. 1 table. [18 refs.]

The results obtained from the treatment of female monkeys with pregnant mare serum, with a highly purified preparation of pregnant mare serum, and with non-pregnant mare serum showed that an anti-gonadotrophic substance can be produced by the injection of relatively small quantities of the hormone, and indicated that precipitins are not responsible for the anti-gonadotrophic action of the sera. It is suggested that the anti-substance may be an antibody.—R. ALLCROFT.

MacDonald, A. M., & Robson, J. M. (1939). **The Production of Vaginal Mucification with the Synthetic Oestrogen, Triphenyl Ethylene.**—*J. Path. Bact.* **48.** 95–98. 5 figs. on 1 plate, 1 table. [7 refs.]

Injections of triphenyl ethylene into spayed mice and g. pigs produced vaginal mucification similar to that produced by small doses of oestrin. As in the case of the natural oestrogen the mucification was increased when progesterone was given at the same time.—R. Allcroft.

Gordon, A. S., Kleinberg, W., & Charipper, H. A. (1939). **The Reticulo-Endothelial System and Hormone Refractoriness.**—*J. exp. Med.* **70.** 333–346. 3 text-figs., 1 table. [Numerous refs.]

The response of the ovaries and testes of young splenectomized and normal rats, free from latent infection, to injections of pregnant mare's serum showed that a definite relationship exists between the reticulo-endothelial system of cells and the formation of antagonistic substances which develop in response to injections of hormone materials. Removal of the spleen, and injection of trypanblue which causes blockage of the reticulo-endothelial elements, resulted in the production of a smaller amount of antihormone substance. Similar results were obtained on splenectomized and splenectomized dye-blocked g. pigs injected with thyrotrophic extract; the thyroids of the treated animals were heavier and more highly active than those of normal hormone-injected animals.

Rats heavily infected with *Bartonella muris* developed heavier ovaries in response to injections of pregnant mare's serum than did normal uninfected rats, due to injury to the reticulo-endothelial system by the bartonella organism.—R. Allcroft.

Godwin, M. C. (1939). **The Mammalian Thymus IV. The Development in the Dog.**—*Amer. J. Anat.* **64.** 165–201. 4 text-figs., 28 figs. on 4 plates, 1 table. [Numerous refs.]

Complex IV, or the fourth pharyngeal pouch of the dog embryo, presents a difficult problem owing to the inability to define accurately its limits, and consequently the ultimate fate of its component parts. The fate of the ultimobranchial body, a pouch in the caudo-ventral wall of the fourth pouch, and of the parathyroid IV component, have been considered in previous papers. This article deals with the origin and development of thymus IV. Forty-three embryos were studied ranging from 4–50 mm. in length. Pouch IV persisted as a part of complex IV in only a few cases. In most of the embryos it was absorbed into the walls of the complex and its limits became indistinguishable. Pouch IV is probably the source of the epithelial portion of thymus IV. The greater part of the ultimobranchial body forms thyroid; the thymus may be external to the thyroid or included within it. There was no indication that parathyroid, thyroid, or ultimobranchial material undergoes thymus transformation.—A. T. Phillipson.

Kelley, R. B. (1939). **Female Aspects of Relative Fertility in Sheep.**—*Aust. vet. J.* **15.** 184–198. 8 figs. [Num. refs.]

The basic facts of the reproductive phenomena in the ewe are reviewed, and the particular characteristics of the sex physiology of the Merino ewe are emphasized. Special attention is drawn to the need for a closer understanding of the periodicity of the sexual cycle in the Merino ewe and some observations on this aspect are recorded. Continuous observation on three groups of Merino ewes and a group of Border Leicester x Merino ewes showed a well-defined periodicity in the percentage of ewes coming into oestrus. In all four groups there was a decrease in the incidence of oestrus during the spring months followed by an increase in the summer to the higher levels maintained during the autumn and winter. Certain differences in the seasonal frequency of occurrence of oestrus were noted between these groups. Since the environmental conditions and management were identical for all four groups it seems probable that such differences were genetic in origin. It is regarded as specially important that the periodicity of oestrus should be closely related to general environmental conditions, especially the curve of grass growth and available fodder, so that optimum mating periods can be selected. Such data are particularly necessary in the marginal breeding areas and work is proceeding with this aim.—H. B. Carter.

Morcos, Z. (1940). **Urine Pregnancy Test in Animals.**—*Vet. J.* **96.** 357–369. 2 figs. on 1 plate. [Numerous refs.]

M. claims that a single injection of 12–15 c.c. of urine from pregnant animals produces

diagnostic reactions in the ovaries and uterus of virgin mature rabbits. 100% accuracy was apparently obtained in tests on women, mares, cows, buffaloes, and bitches. M. states that the method is applicable for diagnosis 2–3 weeks after service in the case of domestic animals.

—N. J. SCORGIE.

ELY, J. O. (1940). **A Fraction of Human Urine Causing Fetus Resorption in Rats and Mice.**—*Amer. J. Cancer.* **39.** 379–380. [Author's summary copied *verbatim*].

The preparation of a fraction from the urine of patients with advanced cancer which causes resorption in pregnant rats and mice has been described. The material responsible for the resorption was found to be present also in the urine of a healthy adult male, but in a much smaller concentration than in the urine of advanced cancer patients.

TECHNIQUE AND APPARATUS

WOOLPERT, O. C. (1936). **Direct Bacteriological Experimentation on the Living Mammalian Fetus.**—*Amer. J. Path.* **12.** 141–151. 2 tables. [13 refs.] [Author's summary copied *verbatim*].

A technique for direct bacteriological experimentation on the living fetus of small laboratory mammals is described. The theoretical and practical advantages of such experimentation are discussed. The results of preliminary experiments illustrating the applications and limitations of this technique are briefly reported.

I. FURCHGOTT, R. F. (1940). **Disk-Sphere Transformation in Mammalian Red Cells.**—*J. exp. Biol.* **17.** 30–44. 2 figs., 1 table. [10 refs.]

II. FURCHGOTT, R. F., & PONDER, E. (1940). **Disk-Sphere Transformation in Mammalian Red Cells. II. The Nature of the Anti-Sphering Factor.**—*Ibid.* 117–127. 4 figs., 3 tables. [12 refs.]

I. The phenomenon of the transformation of the mammalian erythrocyte from disks to spheres when a small drop of physiological saline suspension is placed between a slide and a glass cover-slip was investigated. It was found that there were two factors concerned, namely a rise in pH to over 9·2 due to the alkalinity of the glass, and the adsorption of an anti-sphering factor by the glass. The alkalinity of the slides could be overcome by boiling the slides and cover-slips in distilled water for 15 min. or by using quartz slides and cover-slips, in which case the pH of the film on the slide was just acid and the cells remained as disks. The pH measurements were determined by a micro-glass electrode.

The anti-sphering factor was found to be contained by both serum and cells. The cells could not be washed free of the factor by saline. The only method of removing the factor was by adsorption using glass beads as a large glass surface. If the factor was present, then sphering of the cells was prevented until the pH reached about 11·3; if it was absent, then the cells sphered at about pH 9·2. In the absence of the factor the change in the cells was reversible. Human, dog, horse, and bovine cells all behaved in the same way, and serum from any of these four species could be used as a source of anti-sphering factor for any other of the four species.

The changes observed on the slide could be reproduced in bulk. An anti-anti-sphering factor was found to be present on the skin of the hand. This is assumed to be of fatty acid nature as both oleic and palmitic acid had the same activity.

II. A method of titrating the anti-sphering factor was worked out using the stages of transformation from disks to spheres as an indication of the amount of the factor present. This method proved of use in determining the strength of any serum or of any fraction of the serum used. The serum proteins were fractionated by the method of Kekwick; the globulin fraction was inactive, while the total albumin fraction showed great activity. In the albumin fraction further fractionation showed that a carbohydrate-rich fraction had little activity, while the carbohydrate-poor fraction was very active; the latter fraction is known as crystalalbumin. The activity of a given amount of crystalalbumin was the same as that of a volume of serum containing approximately the same quantity. Experiments in which the crystalalbumin was denatured by heat gave further evidence that the crystalalbumin and not an impurity was the anti-sphering factor. Finally it was estimated by electrophoresis experiments that the amount of crystalalbumin taken up by 100 c.c. of red cells was in the region of 800 mg.—A. T. PHILLIPSON.

MISCELLANEOUS

—. (1940). **Third International Congress for Microbiology, New York, September 2-9, 1939. Report of Proceedings.** pp. xi + 883. Numerous tables. New York: International Association of Microbiologists. [4to] [In English, French, German, Italian and Spanish].

This report contains the full text of a small number of papers read at the general session and summaries of hundreds read at sectional sessions, on a wide range of microbiological subjects including those appertaining to veterinary science. The former papers are being abstracted for the *Veterinary Bulletin*, but not the latter, as almost invariably the subject matter has previously been published in various periodicals. All papers are given in *Index Veterinarus*.

The report volume is a useful reference guide to current veterinary microbiological knowledge; it is also to some extent a guide to leading microbiology personalities of most countries of the world, as full lists of committees, delegates, and members are included.

The congress passed a resolution defining the functions of the International Committee on Bacteriological Nomenclature and a subcommittee of the latter presented a revised antigenic scheme of the genus *Salmonella*.

—J. E.

I. Hart, D., Devine, J. W., Martin, D. W., & Durham, N. C. (1939). **Bactericidal and Fungicidal Effect of Ultraviolet Radiation: Use of a Special Unit for Sterilizing the Air in the Operating Room.**—*Arch. Surg.* **38.** 806–815. 6 figs., 2 tables. [4 refs.]

II. Hart, D., Durham, N. C., Sanger, P. W., & Charlotte, N. C. (1939). **Effect on Wound Healing of Bactericidal Ultraviolet Radiation from a Special Unit: Experimental Study.**—*Ibid.* 797–805. 4 figs., 3 tables. [4 refs.]

III. Hart, D., & Durham, N. C. (1940). **Sterilization of the Air in the Operating Room with Bactericidal Radiation.**—*Ibid.* **41.** 334–350. 5 tables, 7 charts. [9 refs.]

IV. Barenberg, L. H., Greene, D., & Greenspan, L. (1940). **Effect of Irradiation of the Air in a Ward on the Incidence of Infections of the Respiratory Tract.**—*Amer. J. Dis. Child.* **59.** 1219–1226. 1 fig., 2 tables. [10 refs.]

Fresh cultures of various bacteria (*Staphylococcus albus*, *Staph. citreus*, *Proteus vulgaris*, *Pseudomonas pyocanea*, *Bacterium coli*, *Bact. friedländeri*, *Bacillus subtilis*, and β haemolytic streptococci, were diluted 1 : 10,000 with sterile water and sprayed on culture plates and exposed to ultra-violet radiation (over 80% of the output of the irradiation unit being at 2,537 Å units) at a distance of 5 ft. from the centre of the tubes, after which the plates were incubated for 48 hours at 37·5°C. Emulsions of various fungi (*Monilia*, *Mucor*, *Geotrichum*, *Dematium*, *Penicillium*, *Cladosporium*, *Aspergillus*) received similar treatment. The bacteria showed some variation in resistance, but most of them were killed by an exposure of 3 min. The irradiation was also effective for killing fungi, but these organisms were more resistant than the bacteria and varied widely in their susceptibility. *Aspergillus* was most resistant and some of its colonies survived an exposure of one hour.

II. The effect of ultra-violet radiation of an intensity of 28–30 microwatts per sq. cm. at the operative site on wound healing was tested on rats and dogs. The muscles, peritoneum, viscera, brain, and spinal cord were exposed for 10–30 min. in the case of the rats and for 75–90 min. in the case of the dogs. After the operations all wounds were examined for gross infection during periods from 3–6 days, after which microscopic observations were made on sections of tissue extending across the wounds. In all cases the wounds healed as well as control wounds if not better and there was no evidence of damage demonstrable by adhesions, oedema, or increased fluid in the cavity. It is concluded that healing is better in an irradiated wound than in one not irradiated as there is less danger of infection and less local and systemic reaction.

III. A report is given of surgical operations performed in a field of bactericidal radiation; in approximately 2,000 clean incisions no patient died as a result of an infection in the wound. Out of 606 recent cases for which bactericidal radiation was used the rate of infection was less than 1% and not one of them severe. The intensity of radiation (over 88% output at 2,537 Å units) used is much less than 30 microwatts per sq. cm. when shading is taken into consideration, and for some of the operations, the intensity at the operative site was less than 25 microwatts per sq. cm., without

allowance for shading. No complaint referrable to, or any injury from, the radiation has been reported. The personnel can be easily and adequately protected without loss of efficiency; the eyes must be protected by glasses and a closely fitting eyeshade.

IV. The results of a purely clinical investigation on the effect of the sterilization of air in a ward by means of ultra-violet radiation are reported. There was a definite decrease in incidence and in severity of infections of the upper part of the respiratory tract among infants from 7–16 months of age kept in a ward where the air was irradiated intermittently (one half-hour on and one half-hour off) from 6 a.m. to 8 p.m. daily for a period of 4½ months: as a control, a similar group of children was observed during the same period in a ward where the air was not irradiated.—R. ALLCROFT.

PRICE, P. B. (1938). **The Bacteriology of Normal Skin; a New Quantitative Test Applied to a Study of the Bacterial Flora and the Disinfectant Action of Mechanical Cleansing.**—*J. infect. Dis.* **63.** 301–318. 3 figs., 1 table. [15 refs.] [Author's summary copied *verbatim*].

Skin bacteria are of two sorts, "transients" and "residents". Transients acquired mainly by contact, vary greatly in both number and kind. They may be abundant on exposed skin, under nails, etc., but are relatively scarce on clean, unexposed skin.

Resident bacteria form a comparatively stable flora. Forces increasing (chiefly multiplication in situ) and decreasing their number tend to reach an equilibrium. Protected skin has as a rule a somewhat larger resident flora than exposed skin.

After reduction (e.g., by disinfection), re-establishment of the resident flora appears to proceed at a rate represented in general by a sigmoid curve, as is true of bacterial growths in cultures. Hands and arms thoroughly degermed may require a week or more for complete reestablishment of the usual flora. Beneath clothing the generation time is slightly shorter. Under sterile rubber gloves it is much shorter, the existing flora increasing rapidly until it may exceed by far the ordinary flora.

Transients lie free on the surface or are loosely attached along with the dirt by fats; hence they are removed or killed with comparative ease. Resident bacteria are more firmly attached and are far more resistant to attack by either detergents or germicides.

The transient flora may contain any number of pathogenic bacteria, the resident flora relatively few as a rule. Certain contaminating organisms, however, seem able slowly to change status and become permanent residents of the skin. Consequently, prolonged or frequent exposure of the skin to contaminations may result in a resident flora containing many pathogenic germs. Such skin is not easily disinfected. Hands may thus become chronic carriers of virulent organisms.

Scrubbing with brush, soap, and water removes the transient flora readily, but the resident flora far more slowly. Scrubbing (in the manner described) degerms the hands and arms at a regular, logarithmic rate that is constant, irrespective of the size of the original flora. This rate of reduction, roughly, is by one-half each 6 minutes of scrubbing. The largest variable affecting this rate is the amount of vigor used in brushing; the sort of soap used, and the sterility and temperature of water washed in, are less important factors.

ANON. (1939). **The Cleansing of Wounds.**—*Brit. med. J.* Dec. 9th. 1146–1147. [3 refs.]

In a number of cases wounds become contaminated during an operation, either from the air, or from the surgeon's hands through minute glove perforations. JACKSON and JACKSON [(1939). *Surgery.* **6.** 398.] advocate cleansing of the wound with soap and water before closure and claim that by this method they have reduced the incidence of wound infections from 4% to almost nil.—J. M. R.

PYLE, N. J. (1940). **Use of Ferrets in Laboratory Work and Research Investigations.**—*Amer. J. publ. Hlth.* **30.** 787–796. [Numerous refs.]

The albino "English" ferret (*Mustela furo*) and the North American black-footed species (*Mustela nigripes*) are both used in laboratory work in the U.S.A. *M. nigripes*, commonly known as the brown or fitch ferret, is the smaller animal and is somewhat more extensively used. P. has collected a good deal of miscellaneous information upon the characteristics, management, and utilization of laboratory ferrets, and expresses the hope that, by putting it on record, he will stimulate further contributions.

Ferrets breed readily, the average litter size in the U.S.A. being 6–8. Jills should not be permitted to suckle too many offspring, and it

is advisable to keep the straw in the nest-box dry in order to prevent in the young a condition which breeders term "sweats". Solid food may be given from the time when the eyes open, at about four weeks of age, and at four months the animals are suitable for laboratory experiments. Raw meat and milk diluted with its own volume of water constitute a sound basis for a diet, but many different dietaries have proved suitable in practice.

With few exceptions ferrets can be restrained easily, and it is P.'s experience that deep bites inflicted by a ferret's canine teeth always heal by first intention. Animals should be lifted from their cages by the tails.

The most serious natural disease of the ferret is caused by canine distemper virus; it has a high mortality rate and may decimate stocks. It seems probable that a different but closely related virus is responsible for some epizootics. Scabies, one of the manifestations of which is termed "foot rot", staphylococcal abscesses, and respiratory infections, in which streptococci are sometimes incriminated, are among other sources of illness and loss. Helminth parasites rarely cause disease.

Apart from that of canine distemper, the following viruses produce syndromes in artificially infected ferrets:—human and swine influenzas, Rift Valley fever, an acute meningopneumonitis of human origin, fowl plague, and a virus first recovered from Swiss mice. Lymphocytic choriomeningitis sets up a symptomless infection.

The ferret is amenable to inoculation by all the usual routes; in the case of intracerebral and intravenous (jugular) inoculations, it is better to employ light ether anaesthesia. Blood is readily obtained by cardiac puncture. A method of obtaining turbinate tissue from animals killed after inoculation of influenza virus is described.

Small, slightly raised, yellowish-white areas on the lungs, encountered by LAIDLAW and DUNKIN (1926) in about one-third of their cases of distemper, have occasionally been seen by P. in normal ferrets.—ALASTAIR N. WORDEN.

HORSFALL, F. L., Jr., & BAUER, J. H. (1940). **Individual Isolation of Infected Animals in a Single Room.**—*J. Bact.* **40.** 569–580. 5 figs. [10 refs.] [Authors' summary copied *verbatim*].

Equipment for the individual isolation of infected animals in a single room has been designed and constructed. Animals ranging in size from the mouse to the dog and monkey have been successfully isolated in the unit. Animals are kept in cages which are enclosed in relatively airtight metal cubicles. The cubicles are ventilated by forced draft, and the air entering and leaving each cubicle is filtered. The cubicles can be disconnected from the ventilation system and removed to another room without being opened. The unit was designed primarily for the study of influenza virus in ferrets and has been found to be thoroughly effective in preventing accidental or contact infections. Isolation was sufficiently complete to permit the study of normal ferrets and ferrets infected with either distemper virus or influenza virus in adjacent cubicles without the occurrence of cross infections.

RAY, L. F. (1940). **Epidemiology.**—*Bull. med. Libr. Ass.* **29.** 5–8.

Epidemiology is defined in its simplest sense as the study of epidemics but it is pointed out that epidemics are not always due to communicable diseases. Lead and ergot poisoning commonly occur in epidemic form.

The basic sciences bacteriology, chemistry, etc., are primarily concerned with the exciting cause of disease whilst epidemiology involves the study of all the links leading to disease and all the things which go into the life and environment of man as they may be related to the disease process. Epidemiological studies often point the way to the essential cause of disease, and it was from these studies that the causes of typhoid, pellagra, goitre, etc. were elucidated. Epidemiology like the "science of medicine" draws from other sciences the knowledge it requires to solve its problems, but whereas medicine places the emphasis on prognosis and treatment, epidemiology concerns itself mostly with history, predisposing causes, bacteriology, and immunology.—U. F. RICHARDSON.

HINDMARSH, W. L. (1939). **Some Observations of Veterinary Extension Services.**—*Aust. vet. J.* **15.** 230–237.

This paper is a general discussion and review of the relations between the veterinary scientist and the general public in Australia and the means whereby recent knowledge is disseminated. It is urged that in addition to the more usual extension services provided in departmental lectures, pamphlets, circulars, and press articles, better use should be made of (a) exhibitions organized to illustrate the results of research, (b) short films at cinema halls, and (c) broadcast talks.—H. B. CARTER.

BULL, L. B. (1938). **Possible Developments in the Organization of Veterinary Services: a National Veterinary Service in Australia.**—*Aust. vet. J.* **14.** 222–224. Discussion pp. 224–226.

This paper is essentially a plea for the development of larger and wider extension services, involving the closer association of administrative officers with one another and with research workers. Some form of nationalization of the veterinary services of the Commonwealth is considered necessary to attain this end. As a first step the unification of quarantine and meat inspection under one federal department or division and directly responsible to a competent minister is suggested. The state veterinary services would remain as at present, but a federal advisory co-operative council would be formed to consist of federal and state representatives in both administration and research. Where local government bodies existed within a state, a state veterinary council to co-ordinate their activities as a counterpart of the federal council could be formed. The state veterinary services should extend their activities to give services to stockowners in all districts, providing residential district officers whose main work would be associated with preventive medicine and animal husbandry but who would also engage in the treatment of sick animals.

A discussion is appended in which the position of the private practitioner under such a scheme is mainly considered.—H. B. C.

MERKENS, J. (1938). Het veeartsenijkundig onderwijs in Nederlandsch-Indie. **[Veterinary Education in the Dutch Indies].** —*Ned.-ind. Bl. Diergeneesk.* **50.** 384–401. 4 tables.

After an introduction on the history of veterinary work from 1857 onwards, M. outlines the development of veterinary education for natives from 1907 to the present day under the following headings:—the founding of the D.E.I. veterinary school and title of graduates, the curriculum, teaching staff, pupils' buildings, and instructional material.

The course has been, since 1907, of four years' duration with a weekly total at present of about 132 hours study. The teaching staff appears to have numbered three in the last year mentioned—1937, although in 1933–34 it was 16 [data taken from a table]. Between 1907 and 1933 there were 270 pupils of whom 135 passed the final examination and acquired the title of "Government Indian Veterinarian". In 1928 a new veterinary school building was completed at Kedoeng Halang.—J. E.

HOPFENGÄRTNER, M. (1939). Die Bedeutung der Veterinäruntersuchungsanstalten für die Bekämpfung der Wildkrankheiten. **[The Role of Veterinary Research Institutes in the Control of Diseases of Game Animals].**—*Dtsch. Tierärztebl.* **6.** 49–53.

A defence of state control of game preserves in Germany; an appeal for the co-operation of the hunting community, the official veterinary surgeon in charge of the preserve and research institutes in the eradication and prevention of disease among game, and a discussion, in general terms, of the duties of each.—G. W.

LESAGE, J. (1939). La collaboration de la médecine et de l'agriculture. **[Collaboration between Medicine and Agriculture].** —*Pr. méd.* March 29th. 481–482.

Emphasis is laid on the common interests involved in the incidence and management of certain disease conditions of animals and man using as examples for discussion osteomalacia, and the relationship to the local soil of certain breeds of animals, indicating that certain characters have been conditioned by the composition of the pastures and general ecology of the neighbourhood. L. points out that in certain areas the skin of the cattle has particular characters with the result that susceptibility to tick infestation is lower than in the general breeds of cattle, and hence there is a diminution in the incidence of piroplasmosis. L. develops this theme and suggests that attention to the essential chemical constituents of pastures can reduce losses from piroplasmosis.—W. A. P.

RHOAD, A. O. (1940). **A Method of Assaying Genetic Differences in the Adaptability of Cattle to Tropical and Subtropical Climates.**—*Emp. J. exp. Agric.* **8.** 190–198. 1 fig., 8 tables. [9 refs.]

The establishment and selection of new breeds of cattle in tropical climates has mainly proceeded by the trial and error method of determining adaptability. In order to curtail the time necessary in such a method, R. describes a practical test that measures, under field laboratory conditions, the relative efficiency of water-expenditure and of heat-disposal between genetic types of cattle, and thus provides an index of their adaptability to tropical and subtropical conditions.

Employing the method on Aberdeen Angus and Brahman cattle and their cross-bred types, it was found that the pure-bred and three-quarter-bred Aberdeen Angus are not physiologically adapted to the high temperatures and intense solar radiations characteristic of tropical climates. This was shown experimentally by their incapacity to prevent a febrile condition from developing when placed in a tropical environment. On the other hand, the efficiency with which pure-bred and half-bred Brahmans regulated body-temperature in the same environment indicated that tropical climatic conditions were within the range of thermal neutrality for these cattle, which may therefore be considered as physiologically adapted to a tropical environment.—N. J. SCORGIE.

GREAT BRITAIN. (1939). **Ministry of Agriculture and Fisheries. Foot-and-Mouth Disease (Sera and Glandular Products) Order of 1939.** pp. 2. London: H.M. Stat. Off. [8vo].

An order on the regulation of the use of serum or any glandular extract on any cattle, sheep, goats, other ruminating animals, or swine. This order was designed to prevent introduction of disease by such products [see *V. B.* **9.** 701].—R. ALLCROFT.

WAKSMAN, S. A., & WOODRUFF, H. B. (1940). **The Soil as a Source of Microorganisms Antagonistic to Disease-Producing Bacteria.**—*J. Bact.* **40.** 581–600. 5 figs., 10 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

The soil contains a number of different types of microorganisms antagonistic to various bacteria belonging to the gram-positive and gram-negative groups. By enriching the soil with the specific bacteria, the corresponding antagonists increase and can be readily isolated. This has been done most readily by the use of an agar medium containing viable cells of the specific organism as the sole available nutrient.

Out of a number of antagonistic organisms isolated from the soil, two were studied in greater detail, one a bacterium belonging to the *Pseudomonas aeruginosa* group, and the other an *Actinomyces*. These organisms were found to inhibit the growth of several gram-negative bacteria, as well and, even to greater extent, of numerous gram-positive bacteria.

The active substance produced by the two antagonists was found to be largely thermostable; it passed through a Seitz filter, it was removed by charcoal and was, partly at least, ether-soluble. Highly active preparations were obtained which inhibited, in very dilute solutions, the growth of *Escherichia coli*, *Brucella abortus*, and of many other bacteria.

The active substance has also a strong bactericidal effect upon *Escherichia coli* and *Brucella abortus*; 1 ml. of the preparations containing 0·4 mgm. of the crude active substance killed aqueous suspensions of *Escherichia coli* (215,000,000 viable cells) and of *Brucella abortus* (68,000,000 viable cells).

The active substance of the two antagonists was found to reduce, in very low concentrations, the bacterial population of natural substrates, such as milk; when added to agar it prevented the development of the great majority of soil bacteria and actinomycetes, but not of fungi.

—. (1939). **International Directory of Agricultural Libraries.** pp. 311. Rome: International Institute of Agriculture. [8vo] [L.25]. [In English and French].

The information included in this directory was obtained mainly by the questionnaire method and is consequently somewhat unbalanced. Nevertheless, it is a valuable source of information on the locality and nature of the more important agricultural libraries in the world. A selection had to be made of inclusions and omissions; finally, the contents were arranged to deal with :– (1) general agricultural libraries of over 2,000 volumes, (2) smaller specialized libraries, (3) agricultural collections in general libraries, and (4) centres of agricultural documentation, the latter including the Imperial Agricultural Bureaux. For each library are given notes on its age, nature of subjects covered, cataloguing method and staff, library hours and rules, and publications issued.

Veterinary libraries have been included freely but evidently not completely: thus there is no mention of a veterinary library at either Utrecht or Leipzig Universities. None the less the directory is a very useful work. The whole text is bilingual.—J. E.

—. (1938). **E. Merck, Darmstadt. A History of Chemical Achievement, 1827-1937.** pp. 71. Numerous photographs. Darmstadt: E. Merck. [4to].

This gives the history of the firm of E. Merck, the well-known German chemical manufacturers, from 1668, when the Engel Apotheke in Darmstadt was taken over by Jacob Friedrich Merck, to 1937; it was published in honour of the 110th anniversary of the foundation of the present factory in 1827. It is beautifully pro-

duced with four coloured plates and numerous photographs illustrating the working of the factory and the chemical research department, and includes a list of the more important preparations manufactured by the firm, but gives no details of any research work.

HAMPTON, B. C. (1939). **The Public Health Service Leaves the Treasury Department.**—*Publ. Hlth Rep., Wash.* **54.** 1133–1143. 4 plates.

After nearly 141 years the United States Public Health Service has left the administrative jurisdiction of the Treasury Department and been placed under the Federal Security Agency under which are grouped " those agencies of the Government which are to promote social and economic security, educational opportunity, and the health of the citizens of the nation."

An account of the beginnings and development of the Public Health Service is given.

—. (1939). **Biological Products. Establishments Licensed for the Propagation and Sale of Viruses, Serums, Toxins, and Analogous Products.**—*Publ. Hlth Rep., Wash.* **54.** 746–752.

This is a list of the establishments holding licences issued by the Treasury Department, U.S.A.

The granting of a licence means that there is a regular inspection of the establishment and examination of samples of its products to ensure the observance of safe methods of manufacture, to ascertain freedom from contamination, and to determine the potency or safety, or both, of certain named antitoxins, antiserums, vaccines, and toxins, and of arsphenamine, the only products for which potency standards or tests have been established.

Certain products of some foreign establishments are included in the list.

OFFICIAL AND OTHER REPORTS

GREAT BRITAIN. (1937). **Fourteenth Annual Report of the British Empire Cancer Campaign.** [LOCKHART-MUMMERY, J. P.] pp. xxxiii+247. Numerous tables, 1 graph, 1 chart, 7 maps. [Numerous refs.] London: British Empire Cancer Campaign. [4to]

This report consists in the main of a brief summary of the work carried out at the large number of centres receiving grants from the Campaign, together with the detailed reports of these centres and of individual workers. Six maps illustrate the incidence of cancer in certain organs in human beings in England and Wales among males aged 25 and over, during 1921–1930. This is a continuation of a previous report giving an analysis of cancer mortality in relation to site and locality.

Most of the research work described had been published before the report appeared.

—E. G. WHITE.

AUSTRALIA. (1938). **Second Annual Report of the Australian Wool Board for Year 1937-38.** pp. 19. 1 table, 1 appendix. Canberra: L. F. Johnston. [fcp] [1s.] [For first report see *V. B.* **11.** 198].

Investigations into sheep diseases which affect wool production were carried out under the auspices of the Board.

In work on MYIASIS more than 50 substances, including proprietary dressings, were tested as repellents, without satisfactory results. It is suggested that the attraction of the sheep for blowfly is the result of a combination of putrefactive products from the wound with some other substances supplied by the sheep. From a field survey it was concluded that there are four causes of death from blowfly strike:– (1) from exhaustion and toxic absorption from old, extensive strikes; (2) from shock or poisoning following application of dressings; (3) from ketosis, and (4) from septicaemia. In areas where the rainfall had been heavy the condition was associated with scalding from the rain rather than with fully developed fleece rot. Mules' operation, together with crutching, gave good protection in South Australia, where, however, the problem is in any case less severe than elsewhere. The use of the operation for stud sheep and the most suitable time to perform the operation are discussed. The cost was found to be lower than that of other control measures.

Experiments were carried out to study the relation of COPPER POISONING to TOXAEMIC JAUNDICE of sheep [see also *V. B.* **11.** 243]. Sheep which received daily doses of copper sulphate developed symptoms indistinguishable from those of toxaemic jaundice which proved fatal within 2–3 months. Immediately before the onset of jaundice, the amount of copper circulating in the blood stream increased up to

ten times the normal figure; this was followed by other changes including loss of red blood corpuscles associated with anaemia. Similar symptoms were shown by sheep subjected to an exposure to copper sulphate which corresponded to that existing on an experimental farm where the condition was known to occur.

Feeding tests on a number of plants were carried out during the year and the native daisy (*Wedelia asperrima*), the wild sunflower (*Verbesina encelioides*), red cotton (*Asclepias curassavica*), and white cotton (*Gomphocarpus fruticisus*) were shown to be poisonous to stock. Arrangements were made for botanical and veterinary officers and district stock inspectors to submit all suspected poisonous plants for investigation.

The effects of various types of management and disease conditions on FERTILITY of rams was studied.

Whereas treatment with carbon tetrachloride or copper sulphate was satisfactory against the large STOMACH WORM [*Haemonchus contortus*] 43 days after the administration of larvae, neither of the drugs could be relied upon to kill the immature worm 15 days after administration. The practical importance of these results is considerable, indicating the necessity for repeated treatments at short intervals. Investigations were also made into the control of LIVER FLUKE by the eradication of snails, and also into the control of *Oesophagostomum columbianum*, and of EXTERNAL PARASITES.

In work on FOOT ROT, an organism was isolated capable of causing the disease experimentally [see also *V. B.* **9.** 331].

GANGRENOUS MASTITIS was found to occur sporadically in ewes, and the condition could easily be reproduced by introducing into the teat canal a pure culture of an organism isolated.

The earlier sections of this report deal mainly with advances in general publicity, the activities of the International Wool Secretariat in London, and facts of more particular interest to the manufacturing trade. An extensive programme of pastoral research is, however, supported by Wool Board funds and this is mainly being conducted by the Commonwealth Council for Scientific and Industrial Research through the Division of Animal Health and Nutrition and the Council's section of Veterinary Entomology. For the most part Wool Board funds are granted for specific investigations, but assistance has been given for capital expenditure to increase facilities and equipment for the general investigations of the Council.

Research supported entirely or in part by Wool Board funds include the following investigations for which details of progress are recorded in the report:– general blowfly research at the National Field Research Station ("Gilruth Plains"; Queensland); sheep blowfly investigations, principally the application of Mules' operation, repellant dressings and larvicide substances; fleece chemistry to determine the variations in fleece constituents resulting from seasonal nutritional and age changes, mainly in the Merino; the shrinkage and felting of woollens; sheep dipping investigations including observations on the bionomics of *Melophagus ovinus*; investigations of the internal parasites of sheep including ecological studies of haemonchosis and trichostrongylosis; the "winter" control of haemonchosis; treatment of oesophagostomiasis; eradication of *Limnaea brazieri*; sheep rugging investigations; studies on the aetiology and eradication of "foot-rot" in sheep; drought feeding investigations; nutrition and wool production; factors affecting the fertility of the Australian Merino ewe and ram; toxaemic jaundice and copper poisoning; fleece tenderness and canary stain in Merino wool; management of natural and improved pastures; pasture improvement in areas of low rainfall; and poison plants investigations.—H. B. C.

AUSTRALIA. (1939). **Third Annual Report of the Australian Wool Board, for Year 1938–39.** pp. 32. 1 table, 1 appendix. Canberra: L. F. Johnston, Commonwealth Govt. Printer. [fcp] [1s. 4d.] [See also above].

BOOK REVIEWS

KUDO, R. R. [D.Sc., Associate Professor of Zoology, the University of Illinois]. (1940). **Protozoology.** pp. xi+689. 291 figs. [Numerous refs.] Springfield, Illinois & Baltimore, Maryland: Charles C. Thomas. [2nd Edit.] [8vo] [$6.50].

This book has been written for students of zoology, and is a concise text-book which attempts, as far as space will allow, to classify and describe the 15,000–20,000 species of protozoa known to man. The first six chapters are devoted to ecology, morphology, physiology,

reproduction, and variation and heredity, the remaining 37 chapters being devoted to classification and description of the various species. The book is well supplied with excellent illustrations and in each chapter references are given to the principal literature on the subjects covered. It is thus a text-book designed to give basic information only, but containing references to other literature from which more detailed descriptions can be obtained. Unfortunately the species of protozoa parasitic in man and domestic animals are dealt with so meagrely that the accounts given of them have little value and are not always accurate. It is stated, for instance, that *Theileria parva* is transmitted by the tick *Rhipicephalus evertsi*, and that fatal infection with sarcosporidia is not uncommon. The book will appeal only to those veterinary surgeons who have a good knowledge of the parasitic protozoa and wish to compare the parasitic with the free living species.—U. F. RICHARDSON.

BAYLIS, H. A. [M.A., D.Sc., Deputy Keeper in the Department of Zoology, British Museum (Natural History)]. Edited by SEWELL, R. B. S. [Lt.-Col., C.I.E., Sc.D., F.R.S., I.M.S.] (1939). **The Fauna of British India, including Ceylon and Burma. Nematoda. Vol. II. (Filarioidea, Dioctophymoidea and Trichinelloidea.)** pp. xxviii+274. 150 figs., 1 map, 1 appendix. [Numerous refs.] London Taylor & Francis, Ltd. [8vo].

This is the second and concluding volume of the author's treatise on the class Nematoda [see *V. B.* **7.** 183]. The plan followed is the same as that in the first volume, but includes also a host list covering both volumes. There is an extensive list of references, followed by a systematic index and chapters dealing systematically with the three superfamilies. The spirurids are grouped as a family under the Filaroidea.

Genera and species of uncertain zoological position are described in an interesting appendix. An addendum to volume I contains a brief description of the family Quimperiidae which is stated to be related to the Kathlaniidae. The book concludes with a classified list of hosts and an alphabetical index of the scientific names of the parasites, synonyms being printed in italics.

Species are very fully described and the well-produced diagrams facilitate the reading of the text. Very useful inclusions are the synonyms given after the scientific names and the easily understood keys to the identification of the various species. The intermediate hosts are mentioned where known. The book will be very useful to veterinary readers especially those interested in Indian parasites.—A. L. W.

MENKIN, V. [Department of Pathology, Harvard University Medical School]. **Dynamics of Inflammation. An Inquiry into the Mechanism of Infectious Processes.** pp. ix+244. 50 figs., 27 tables. [Numerous refs.] New York: The Macmillan Co. [8vo] [15s.]

An analytical review of experimental results of past and present workers on the subject of inflammation as well as a very clear presentation of the author's own most recent studies. The monograph should prove of great value, primarily to the pathologist and bacteriologist, but also the physiologist and biochemist.

The opening chapter sketches the historical development of the study of inflammation in relation to medicine with mention of the various concepts which have dictated modern interpretation of inflammatory phenomena. The ensuing chapters deal exhaustively with the biophysical and biochemical factors involved in the mechanism of capillary filtration, with details of the extraction and properties of the organic permeability factor "leukotaxine". Several chapters illustrate conclusively the effect of leukotaxine on cellular elements and the part played by them in fixation processes in an inflamed area. The concluding chapters on specific inflammation in the immune body and the mechanism of bacterial invasiveness demonstrate admirably that intravital staining is invaluable in the study of inflamed tissues, and give long-neglected interpretations their proper value in the explanation of differences in the invasive behaviour of bacteria.

Pleasing features of the text are the summaries at the end of each chapter, the excellent illustrations and the clear explanatory notes accompanying them. The subject index, bibliography, and index to authors referred to in the text are very comprehensive.—R. O. M.

INDEX VETERINARIUS

The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

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